JANUARY 23, 1956

STEEL
The Metalworking Weekly

A PENTON PUBLICATION

College Recruiting

Competition for quality personnel means you must do more of it and more effectively, especially if yours is a small or medium firm . . . page 40

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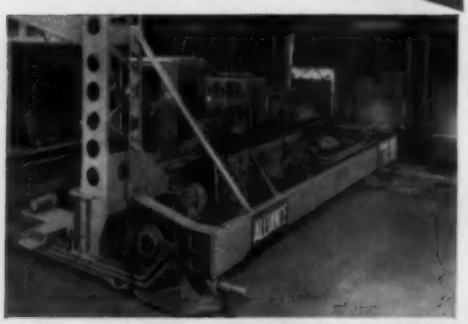
EC&M TAB-WELD Plate Resistors have set new standards for performance, ease of specifying, selection and stocking of spare sections. These sections use one construction throughout (the TAB-WELD design) which has proven successful in hundreds of installations on cranes, charging machines, unloaders, screwdowns and other steel mill auxiliary drives.

For efficient results and maximum economy in use, application and service, EC&M TAB-WELD Plate Resistors offer top performance. Specify "EC&M TAB-WELD" . . . the proven resistor-section.



Chargers . . . the acid test of resistors where EC&M TAB-WELDS operate trouble-free.

Factory-assembled Screwdown Control . . . no periodic nut tightening with TAB-WELD Resistors.

Also for battery-chargers, smoke precipitators and similar applications...

Write for Bulletin 942

THE ELECTRIC CONTROLLER & MFG. CO.

4498 Lee Road • Cleveland 28, Ohio

6814

Truckload of bricks bundled in lots of 100 with strapping made by Signode Steel Strapping Co., Chicago, Ill.

Look what's happened to the hod-carrier!

A few cents' worth of steel strapping enables this fellow to wheel 100 bricks at a time around the job-site, where his predecessor carried only ten!

Yes, they work a lot of magic these days with that familiar packaging standby, steel strapping. Cargo handlers secure lading with it, warehousers bind pallet-ends with it, builders tie up forms for concrete columns with it. There appears no limit to the promotional imagination of steel strapping manufacturers.

The raw material for most steel strapping is hot-rolled coiled sheets. Steel-strapping manufacturers look to Bethlehem for a healthy mileage of this raw material. Strapping is one of the many uses of sheet steel which have grown into important consumers of Bethlehem sheets during recent years. Combine the many relatively new and fast-growing sheet uses with the longer-established ones, and you can understand why Bethlehem is being called on to turn out steel sheets in larger volume than ever before. We are making every effort to overtake the unprecedented demand.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM SHEETS

BETHLEHEM STEEL

Veteran Chief takes post-graduate training at Ansul fire school...you can too

Throughout his entire career, Floyd Dumas has practiced what he preached . . . *you can't have too much fire training.* So it was logical that this veteran of 29 years' experience should attend Ansul's Fire Training School. As Chief of Fire Prevention for Parke Davis & Co., one of the nation's leading manufacturers of pharmaceuticals, his responsibilities are tremendous. The information Floyd took home from the Ansul School was passed on to each member of his staff who will be better firefighters for it.

You too can have this training. Ansul is the nation's pioneer in the field of fire training, and the only manufacturer to offer this important service to its customers. It is just one of many "extra" services made available to all Ansul users. And there is no charge whatsoever. Since 1940 this unique school has graduated over 2,800 students from all over this hemisphere, parts of Europe, Asia, and the Middle East.

Training at the Ansul Fire School is of the practical kind. The classroom is Ansul's five-acre test field containing all the latest equipment, and staffed by expert instructors. You owe it to your business, to your position, to learn more about the Ansul Fire Training School.

Get in touch with your local ANSUL MAN through the yellow pages of your phone directory, or write to THE ANSUL CHEMICAL COMPANY, DEPT. S-1, MARINETTE, WISCONSIN.

ANSUL

The handling ease of an ATLAS Sling means . . .

safe, fast, low-cost material lifting!

Handling bed casting for 2500-ton forging press are two Macwhyte ATLAS Type 1 Round-Braided Wire Rope Slings.

A SLING DESIGNED TO HANDLE EASILY WILL HELP YOU HANDLE LOADS faster. That's the reason why flexibility, lightness, and *handling ease are results of the basic design* of Macwhyte ATLAS Round-Braided Slings.

Here's how handling ease is built into the ATLAS Sling: All ropes in ATLAS Slings are braided in a continuous spiral path. Ropes are endless—all ropes in the body are the same length and carry an equal share of the load. There are two pairs of Left Lay, and two pairs of Right Lay ropes—making a total of eight ropes in the equally balanced braided body of the Sling.

Users can attach ATLAS Slings faster because of their "built-in" handling ease. And these Slings last longer because they do not snarl, kink, or curl up as easily as ordinary slings.

The Macwhyte Sling Catalog illustrates many standard designs in Round-Braided, Flat-Braided, Single-Part, and Grommet Slings.

Recommendations for special designs will be supplied by Macwhyte Sling Engineers.

Call a Macwhyte distributor or Macwhyte office:

MACWHYTE COMPANY
2912 Fourteenth Ave., Kenosha, Wis.

Ask for Sling Catalog S-8

MACWHYTE

Manufacturers of Internally Lubricated PREformed Wire Rope, Stainless Wire Rope Slings, Aircraft Cables and Assemblies, Flexi-Rotor Stainless Steel Wire Rope, and Wire Rope Assemblies. Special ratings are available.

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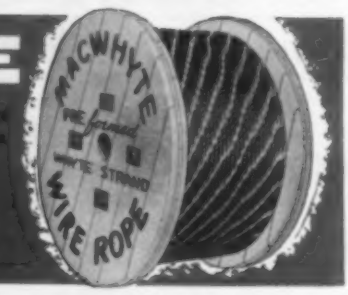
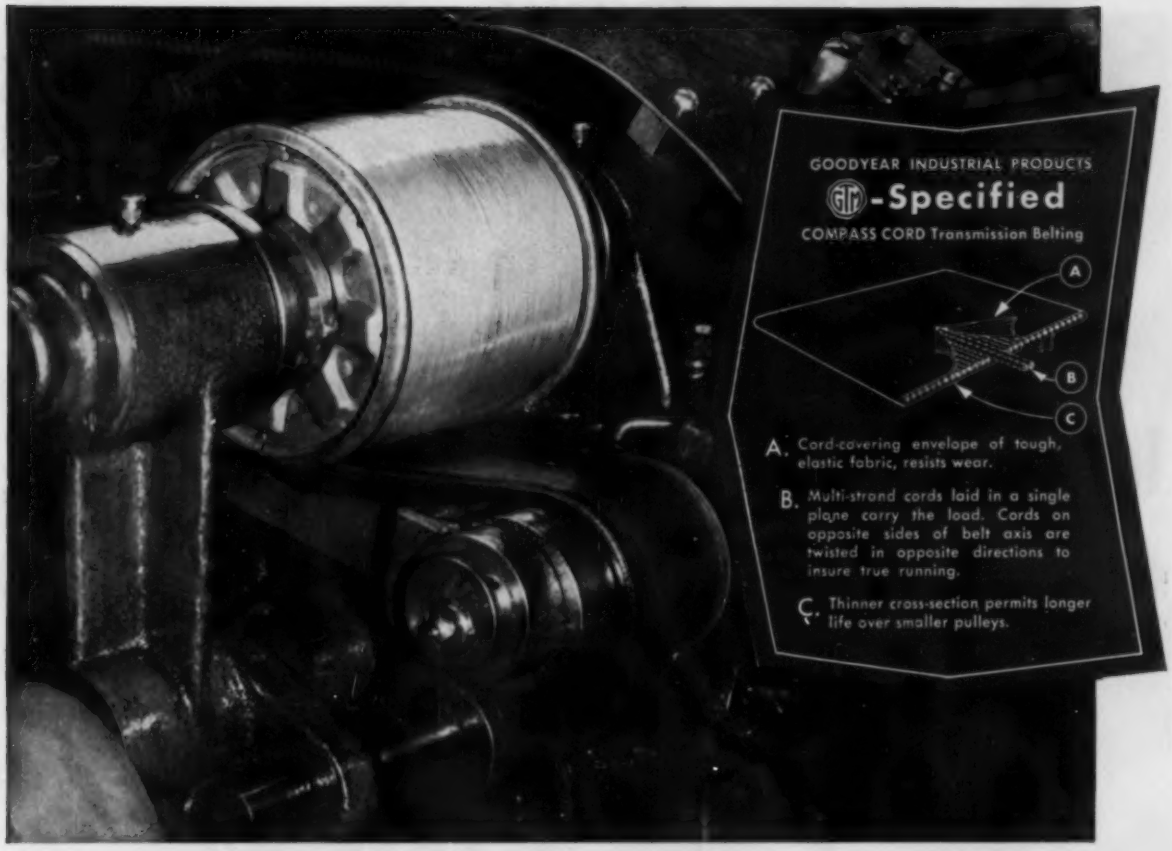
Seattle 4, 87 Holgate Street
San Francisco 7, 188 King Street
Los Angeles 21, 2075 Sacramento Street




GOODYEAR INDUSTRIAL PRODUCTS
G.T.M.-Specified
COMPASS CORD Transmission Belting
A
B
C
A. Cord-covering envelope of tough, elastic fabric, resists wear.
B. Multi-strand cords laid in a single plane carry the load. Cords on opposite sides of belt axis are twisted in opposite directions to insure true running.
C. Thinner cross-section permits longer life over smaller pulleys.

1200% more life

from wire-winding belts

ONCE steel wire is drawn, it must be wound on spools. This is done on special machines with the help of short, endless belts.

Previously used belts lasted only six weeks. Excessive oil, severe abrasion, short centers and high speed were the reasons for such short life. The G.T.M.—Goodyear Technical Man—was consulted. He suggested COMPASS CORD Transmission Belts (see blueprint) with oil-resistant top covers.

RESULT: These endless cord belts *cost less than half* of those formerly used—*last an average of 18 months*—cut down-time and maintenance costs inestimably.

How can the G.T.M. and COMPASS CORD Transmission Belts cut your drive costs? Find out by contacting him, your Goodyear Distributor or writing Goodyear, Industrial Products Division, Akron 16, Ohio.

YOUR GOODYEAR DISTRIBUTOR *can quickly supply you with Hose, Flat Belts, V-Belts, Packing or Rolls. Look for him in the yellow pages of your Telephone Directory under "Rubber Products" or "Rubber Goods."*

COMPASS CORD TRANSMISSION BELTS by

GOODYEAR

THE GREATEST NAME IN RUBBER

Compass—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

STEEL
The Metalworking Weekly

JANUARY 23, 1956
Vol. 138 No. 4

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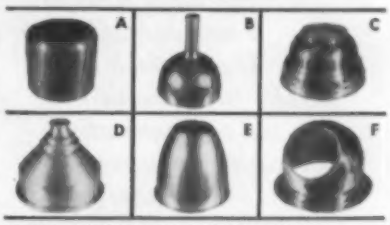
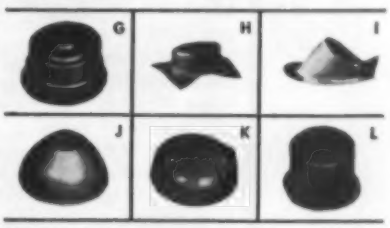


METAL SPINNING AND SPINFORMING:
Typical items: A—Aircraft detail; B—Handle lamp; C—Lamp shade; D—Lamp base; E—Electronic cover; F—Compass cover.



HYDROFORMING:
Typical items: G—Appliance cover; H—Jet engine detail; I—Aircraft detail; J—Jet engine detail; K—Cleaner cover; L—Motor housing.

ROLAND TEINER
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behind the scenes

Song of India

"What doth it profit a man," Bulganin might be excused for murmuring, "if he pranceth up and down the length of India preaching charity and omniscience, Soviet style, only to learn that India turneth, instead, to STEEL for technical advice and guidance?"

It's enough to make a man turn in his party pin, that's what it is. The sweet talk didn't make much of an impression on the executives of the Thakurdass Sureka Iron Foundry Ltd., with offices at 172 Jogendra Nath Mukherjee Rd., Salkia, Howrah. Instead of taking their troubles to the Kremlin, they came to STEEL. They wrote as follows:

Gentlemen:

"We have decided to install 'Egg Shape Furnace' having the dimension of melting zone as 50" from brick to brick. As such type of Cupolas are very uncommon in this region we are not fully aware of its technical datas. This is why we as usual sought necessary assistance from Republic Steel Corporation, who in response has suggested us your journal to be the best one in this respect. May we therefore venture to request you to be so kind as to favor us with the complete technical datas for the installation of the said Cupolas.

"For your information we deem it wise to mention here that our foundry is adorned with six Cupolas having its melting capacity @ 7 to 8 tons per hour per Cupola."

The Thakurdass people said they were awaiting an early compliance, and signed themselves faithfully in a beautiful Sanscrit, and we think the whole thing is a delightful compliment.

Too Sharp To Classify

The Penton Census of Manufacturing is a continuing study of metalworking activities. This study has been going on since 1939; its findings are highly confidential and worth over a million dollars—but it's not for sale. The information gathered is classified and filed for Census Department use only.

In the course of checking a census return, Amy Lombardo, Lists and Directory Department, stared at some replies scribbled by a GE employee from the Ithaca, N. Y., laboratory. The General Electric activities at that particular address were grouped under "Research," but what stumped Amy was "Most important product." Written directly after it was the word "PROGRESS."

She wrote across it "How would you classify?" and passed it on to STEEL statistician Newman Ladabouche. Newman passed it on to us, and we're passing it on to you, and we don't think any census reply ever got such a run-around.

St. Peter Please Note

The Machinist, official weekly newspaper of the International Association of Machinists, carried a few weeks ago under the by-line of Merle Travis some comments about coal mining. "Things have changed," wrote Mr. Travis. Coal mining is now an occupation to be proud of. The company store is a vendor for general merchandise which the miner pays for in U. S. currency and not brass tokens issued by the company he works for, to constantly remind him that he's in debt."

Mr. Travis is singularly qualified to voice these opinions, because he was once a miner himself. At a certain period in his life he threw down his shovel and picked up a guitar—and shortly afterward he wrote a song called "Sixteen Tons."

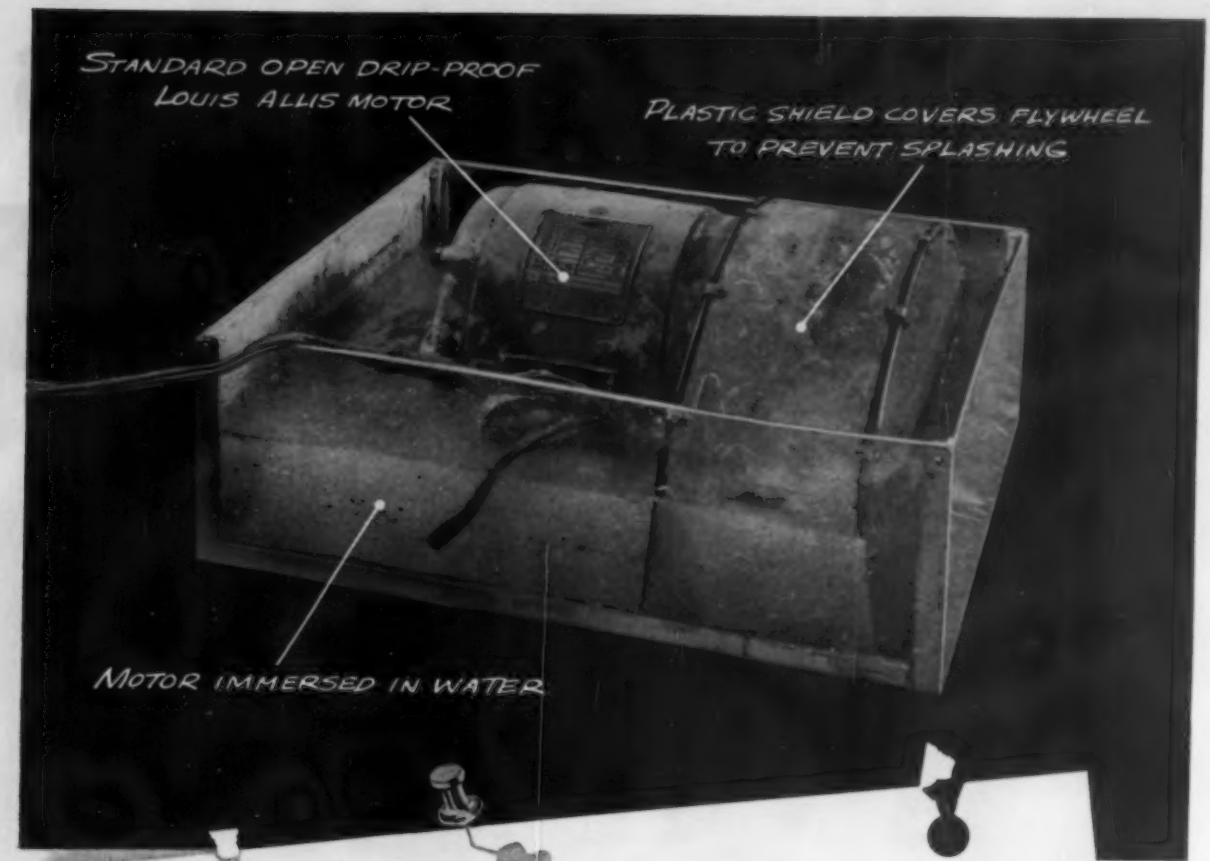
Letters To Ciphers

J. Robert Wells, research chemist at the Anaconda Co., Great Falls, Mont., recently sent in a list of correct answers to puzzles appearing here as far back as last summer. He offers, too, "a small stinker, deceptively simple, a straightforward problem in addition." You merely substitute ciphers for letters to get the answer:

SEND
MORE
MONEY

Shrdlu

(Metalworking Outlook—Page 33)



In water 1½ years...still running

Dramatic proof that Louis Allis motor insulation provides unusual moisture resistance

We wouldn't do this to a motor. But somebody did, to check our new insulation. They took a standard open drip-proof motor, placed it in water up to the shaft, and ran it a year and a half.

The motor will still run, too, which proves that our insulating materials are of top quality. One of our exclusive features is the new phenolic impregnating varnish we use. As you can see, this varnish resists moisture, but it also has excellent thermal and chemical resistance and is not susceptible to embrittlement.

Insulation usually determines the life of a motor. That's why the insulating materials used in the new L. A. line are the product of years of continuous research and development. That's why Louis Allis motors run longer . . . give less trouble.

Find out the many other advantages available to you in the new L. A. line of motors. Write for our new bulletin No. 1700.

A complete line of standard rerated motors in frames 182 through 326U now in stock. Special rerated motors are available on short delivery.

LA-107

THE LOUIS ALLIS CO.
MILWAUKEE 7, WISCONSIN

Republic Electro Paintlok® doubles

ONLY ONE COAT OF PAINT on Republic Electro Paintlok, results in a handsome, durable finish for these Temprite water coolers. In addition, Republic ENDURO® Stainless Steel is used for fountain tops to provide life-time beauty and sanitation.

SEVERE FORMING AND BENDING are shrugged off by chemically treated, electro plated zinc surface of Electro Paintlok. In fact, the phosphate coating itself acts as a lubricant for certain forming operations. Send coupon for full details.

REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels

production of existing facilities

By using Republic Electro Paintlok instead of cold rolled sheet steel for their water cooler housings, Temprite Products Corporation of Birmingham, Michigan, actually double the output of their painting and drying facilities. How? Because only one coat of paint is used on these parts when fabricated from Electro Paintlok, and one pass through the drying oven is sufficient to produce a high-quality, long-lasting finish.

In contrast with this, uncoated sheets for this application required a prime coat before final painting. Temprite found, through experience, that the labor and material cost of the primer coat exceeded the extra cost of Electro Paintlok. Even more important, at today's level of demand *they could not maintain required volume of production when both a primer and final coat of paint had to be applied and dried.*

As a result, Temprite has standardized on Republic Electro Paintlok. And in addition to cost and time savings, they secure a higher quality finish as well. Even when scratched through, Electro Paintlok's chemically treated zinc surface continues to retard corrosion and effectively limits it to the point of original damage.

Add all of these advantages to the fact that Electro Paintlok is delivered from the mill in prime condition for painting and will not rust under approved warehousing conditions . . . and you can see why it will pay you to investigate its use wherever you have a paint adherence problem. Simply contact your Republic representative or mail the coupon for full information.

BUILT-IN SALES APPEAL for the Temprite Club Bar, four-beverage dispenser, is secured through the use of ENDURO Stainless Steel for all housing components. The lustrous beauty of ENDURO harmonizes with any surroundings . . . stays bright and sanitary indefinitely without laborious polishing. Republic makes all analyses of stainless to meet every application. Coupon will bring full information by return mail.

PRODUCTION PROBLEMS VANISH when you specify Republic Steel Sheets. Whatever your requirements, your Republic representative or steel distributor can help you select the ideal type of sheet. He is backed by a broad selection including hot rolled, cold rolled, galvanized, Galvannealed, Electro Paintlok, Electro Zincbond®, Electro Flashcote and other types in a wide variety of analyses.

END PRODUCTION BOTTLENECKS by sending your sheet steel fabricating problems to Republic's Berger Division. You get the benefit of complete contract fabricating facilities, plus a wealth of experience, designed to form high-quality sheet steel into products or components of your own design, economically. Investigate this means of cutting tooling costs and plant additions. Mail the coupon for further data, today.

STEEL

and Steel Products

REPUBLIC STEEL CORPORATION
3120 East 45th Street, Cleveland 27, Ohio

Please send me further information on:

- ☐ Republic Electro Paintlok
- ☐ Republic ENDURO Stainless Steel
- ☐ Berger Division Contract Manufacturing Facilities
- ☐ Republic Sheet Steel (specify)_____

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

C-1084

YOU *Can* AVOID DIE COSTS COMPLETELY!

ON YOUR NEXT STAMPING ORDER

Yes, you can — but it's not *necessarily* the best thing for you.

You want the lowest unit cost — *for the life of the part*, including re-runs. It may well be that our **Machine-Cut Method**, with no die cost, does work out best.

Or, it might better be our **Short Run Method**, using economical blanking dies and stock punches.

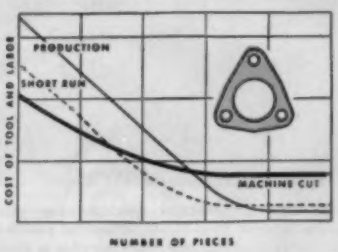
Sometimes, even with very short runs, it pays to use our **Production Method** with a standard die or our own surprisingly inexpensive Hecht-type tool.

In *any* case, the decision is a technical one based on many factors, not just length of run. You save money when the correct decision is made.

WE USE ALL THREE METHODS — LET US MAKE AN IMPARTIAL DECISION FOR YOU

For example, take the part illustrated. From 1-65 parts, our Machine-Cut Method is most economical. At 65 parts, the Short-Run Method is best until, at 7,000 units, the standard Production Method is most satisfactory.

These breaking points as charted vary drastically with every stamping, but the general principle remains the same.



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STAMPINGS DIVISION

"ONE PIECE OR ONE MILLION"

STAMPINGS DIVISION, LAMINATED SHIM COMPANY
3401 Union Street, Glenbrook, Conn.

Gentlemen:

Please rush me my free copy of "SERVICE IN STAMPINGS"—the 12-page, illustrated booklet full of helpful facts on the economical buying of stampings.

NAME_____ TITLE_____

COMPANY_____

STREET_____

CITY_____ ZONE_____ STATE_____

LETTERS
TO THE EDITORS

Editorial Put in Letter

Would you give us permission to quote a few paragraphs from the editorial, "Guideposts for '56" (Jan. 2, page 99)? We were greatly impressed and would like to use your thoughts in a letter.

John B. Van Domelen
John B. Van Domelen Agency
Grand Rapids, Mich.

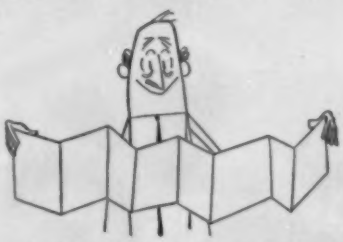
• *Permission granted.*

Report Is Easy To Read

The report, "What Metalworking Management Expects in 1956" (Jan. 2, page 105), is exactly the type of information which management requires. You are to be commended on the excellence of this report. It is clear, concise and has a quick readability not usually found in reports of this nature. Please send 10 copies.

T. H. Walton
Purchasing Agent
Teleflex Inc.
North Wales, Pa.

Selector Pleases Reader



Recently I had the opportunity of looking over the Metal Selector (insert in Oct. 10 issue). I was pleased with this, since it gave the most complete outline of the various metals and their uses that I have seen. I would appreciate a copy.

D. Blanchard Jr.
Aluminum Co. of America
Cleveland

On High-Purity Aluminum

In a recent issue (Oct. 31) you ran a short article, "Germans Brighten Aluminum" (page 90), the implication being that this was news. We wish to advise that we have been selling our high purity aluminum in the U. S. under the tradename, Lurium, for the past three years.

We would like to correct statements of fact in your article.

1. You state: "The exceedingly bright metal is being offered as a substitute for nickel and chromium." One of your readers would assume (as some of them have) that the metal is capable of being electro-plated on steel. This is not so.

2. Your article states: "The price is . . . 43 cents a pound." Does your article refer to pig, ingot, slab, plate, sheet, strip or foil?

3. You state: "It's applied like foil in a thickness of .078 inches." We would appreciate an explanation of what this

(Please turn to page 12)

COMPLETE YOUR DATA FILES

S-200 REVIEW OF AIR GAGING
In "A Review of Pneumatic Dimensional Gages", Louis Polk, chairman and president of The Sheffield Corporation, describes the different types of air gages, their applications and uses. Amply illustrated with schematic drawings of pneumatic circuitry and photographs of multiple-dimension and automatic air gages. Contains selective bibliography on air gaging. 24 pages.

S-201 THEORY OF GAGING
Reprint from an address before the American Society of Mechanical Engineers, this six page technical paper reviews the operating principles of several types of mechanical, electrical, electronic and pneumatic gages. Many schematic drawings.

S-202 66 CENTURIES OF MEASUREMENT
Commemorative booklet issued at the time the permanent exhibit of precision measuring instruments was established at the Smithsonian Institution, Washington, D. C. Includes 16 colored drawings depicting significant periods and advancements in the history of measurement since 4700 B.C.

S-203 VISION IN METROLOGY
Printed from an address by Louis Polk, this pocket size booklet tells the story of measurement from the Cubit of the ancients to the "Barn" of the atomic age. In conclusion, the author presents some stimulating thoughts about the methods for dimensional control in the future.

S-204 ELI WHITNEY METROLOGY LABORATORY
This pocket-size booklet describes the construction, inspection environment, and instrumentation in Sheffield's newly opened laboratory for precision measurement. Lists the types of measurement and Inspection services available to Industry including Gage Block and End Measure Calibration, Hardness Testing, and Surface Finish Analysis.

S-205 CATALOG
Twelve page, easy-to-read catalog containing application and engineering data on standard Sheffield control units for automatic machine control, gaging, classifying, and segregating processes. Many photographs and diagrams of typical automated production processes.

S-206 THE SHEFFIELDER
A 4-page newspaper written for shop, production, and inspection personnel. Mailed free-of-charge 4 to 6 times a year. Contains feature articles and photographs on new gages and inspection instruments, better inspection practices, and news from Sheffield's Machine Tool Division.

S-207 GENERAL CATALOG
New 16-page, fully illustrated General Catalog of Sheffield Precision Products and Services. Included are Thread and Form Grinders, Annular Form Grinders, Crushtrue Grinding Machines, Threading Machines, Taps, Chasers, and Ultrasonic Machine Tools; also, Precisionaire inspection gages, Automatic and Multiple dimension gages, Toolroom and Inspection Instruments, and Contract Services.

S-208 NON-CONTACT X-RAY GAGE
A 16-page catalog describing the Sheffield "Measuray"—a non-contact X-Ray gage for continuous or intermittent measurement of strip or sheet stock while in motion or stationary—hot or cold. Contains models and capacity ranges as well as types of materials on which it can be used.

S-209 PRECISIONAIRE INSTRUMENTS
This 30-page catalog and price list on Precisionaire column-type air gages contains the full line of base instruments, with their amplifications and scales, and complete lists of standard sizes and types of air spindles, air snaps, Plunjet gaging cartridges, and types and sizes of adjustable air tooling.

S-210 PLUNJET GAGING CARTRIDGES
A 24-page catalog showing types, sizes, amplifications, tolerance and ranges of Sheffield Plunjet gaging cartridges. Contains engineering and technical data on the use of Plunjets to single and multiple dimension inspections and for machine control applications.

S-211 AIR GAGING JET ENGINE BLADES AND BUCKETS
The critical dimensions and conditions of jet engine blades or buckets and how they are gaged quickly and accurately with Sheffield Precisionaire gages are described in this 28-page catalog.

S-212 ADJUSTABLE AIR GAGE TOOLING
Engineering Data Sheets describing types and sizes of adjustable air gage tooling for use with Precisionaire instruments and other makes of air gages. Gages for measuring inside diameters include four adjustable spindles with ranges from ⅜" to 9/16", 9/16" to 1", ¾" to 1 ¼" and 1 ¼" to 3"; also, the adjustable Airebore Gage Kit for any size bore from 3" to 12", and the 1" to 3" adjustable Balljet spindle kit. Standard 1" adjustable Plunjet Snap gages are available covering the range from 0" to 12".

S-213 AIRETEST INDICATOR
An 8-page Engineering Data Sheet covering the use of the Sheffield Airetest Indicator with the column type Precisionaire. It describes how this new style pneumatic pickup unit is used to accurately determine height, flatness, parallelism, and concentricity.

S-214 PLUNJET STEEL AND STONE FLATNESS GAGES
This Engineering Data Sheet shows how a Plunjet gaging cartridge applied to either a steel or stone surfaceplate makes an ideal combination for checking flatness to a high degree of accuracy.

S-215 PLUNJET EXTERNAL GRINDING GAGES
Engineering Data Sheet showing how a Plunjet gaging cartridge is used with Foster and Arnold Visual Grinding Gages to indicate stock removal evenly without oscillation or flicker normally associated with a dial indicator reading.

S-216 CRUSHTRUE WHEEL DRESSING PROCESS
What Crushtruing is and how it can be used is told in this 12-page catalog. Contains types and sizes of Crushtrue devices available for both surface and cylindrical grinders, and information on their selection. Many case histories and illustrations.

S-217 PRECISION THREAD AND FORM GRINDERS
Machine information and specifications catalog on Models 101, 103, 105, and 107 Precision Thread and Form Grinders. All models capable of plunge grinding.

S-218 MODEL 109 PRECISION ANNULAR FORM GRINDER
Use and specification information on this grinder which has a capacity of 12" between centers and will grind a maximum diameter of 4" with a 14" wheel, and will accommodate work up to 7" in diameter.

S-219 MODEL 180 CRUSHTRUE MULTI-FORM GRINDER
An 8-page catalog covering machine features and specifications of new model 180 Grinder. This machine uses a 4" wide Crushtrue dressed wheel and will grind work up to 10" in diameter and will accommodate a workpart 24" long. Features automatic grinding and gaging, automatic Crushtruing and automatic compensation for wheel wear after dressing.

S-220 MODEL 134 PRECISION THREAD AND FORM GRINDER
Both single and multi-pass models are described in this 8-page catalog. Model 134 is used to grind threads up to ¼" diameter x 4" long within a pitch range from 20 to 120 T.P.I. Machine features include automatic grinding cycle, automatic wheel dressing, and automatic compensation.

S-221 MICRO-FORM GRINDERS
An 8-page catalog with inserts covering Sheffield's Micro-Form Grinders. These machines grind circular and flat form tools, templates, profile gages, cams, and Crushtrue rolls, etc., directly from a drawing of 50:1 ratio. Neither templates nor masters are required. Work is checked without removing from machine.

S-222 MODEL 140 GEAR GRINDER
An 8-page catalog containing machine and specification information on this reciprocating type gear grinding machine that is used to produce precision ground helical and spur gears from 8 to 50 inch. Crushtruing is used to form the grinding wheel to the basic rack form. Maximum work diameter is 8" and grinding stroke 4".

S-223 GEAR DEBURRING MACHINES
Machine features and specifications of seven models of gear deburring machines are described in this 8-page catalog. Both single and two station models are included.

S-224 GEAR AND SPLINE DEBURRING MACHINES
Six standard models and their specifications are included in this 8-page catalog. These machines are used for precision chamfering, tooth rounding or pointing of gears and splines. Gears up to 12" in diameter can be handled on standard machines—larger on special.

S-225 MACHINING THE UNMACHINABLE
A 16-page booklet describing the techniques, advantages, uses and machines for ultrasonic machining of hard materials such as carbides, glass, and ceramics.

S-226 AUTOMATIC WELDING MACHINES
A 4-page Engineering Data Sheet describing both Point and Disk type welding machines that are used for automatic welding of point and disk shape contacts of precious and semi-precious metals to small contact arms, leaf springs, and instrument components. Examples of metals that can be welded are gold, silver, platinum, palladium, and iridium.

S-227 THREADING TOOLS — TAPS AND DIE HEADS
A 16-page catalog showing a large variety of types and sizes of the threading tools available from the Murchey Division of Sheffield. Included are collapsible taps and self-opening die heads, solid taps, chasers, and chaser accessories for setting and grinding.

S-228 PRECISION THREADING UNIT — PRECISION-PAK
The Sheffield PRECISION-PACK, a self-contained precision threading unit that can be used also for boring, chamfering, and reaming is described in this 4-page folder. Threading capacity: Internal—1 ¼" to 4"; External ¾" to 4"; Maximum pitch 8.

S-229 THREAD ROLLING ATTACHMENT — PRECISION-ROL
A 4-page folder covering five standard models of PRECISION-ROL thread rolling attachments for automatic screw machines and turret lathes. Many case histories with threading production times included.

S-230 VISUAL GAGES
A 20-page catalog on the "Shop Proof" Visual Gage—an indicating comparator which is set by precision gage blocks or master gages. Includes types, sizes, amplifications, accessories, and their use in receiving, production, and final inspection.

S-231 ELECTRONIC GAGE BLOCK COMPARATOR
Engineering Data Sheet covering the Sheffield Electronic Gage Block Comparator that is used to calibrate gage blocks to reference masters to a certified accuracy of several millionths of an inch. Available with dual amplifications of 50,000/200,000, 10,000/100,000 or 10,000/20,000 to 1.

S-232 ELECTRONIC HEIGHT INDICATOR
Engineering Data Sheet on this Height Indicator that has a vertical range 0" to 20" and standard amplification of dual 1,000/2,000 to 1.

S-233 ELECTRONIC LEAD MEASURING INSTRUMENT
A 4-page Engineering Data Sheet describing an Electronic Leadchek which will handle work up to 36" between centers and a maximum diameter of 10". Standard remote Electronic Amplification, 2,000 to 1.

S-234 ELECTRONIC INTERNAL MEASURING INSTRUMENT
A 3-page Engineering Data Sheet covering Type N-6 Internalchek used to inspect master and ring gages and other high precision work for size, taper, bellmouth, and out-of-roundness. Standard inspection range .370" to 12", with a vertical range up to 1 ½". On special order, diameters down to .240" can be inspected.

S-235 DIMENSIONAL CONTROL AND GAGING POLICY
A 40-page booklet containing important information for inspection personnel on gages and gaging policy, gagemakers' tolerances, unilateral and bilateral gage tolerances, and the care, control and use of gages. Also, included are diagrams and charts on Unified and American Standard Screw Threads.

THE SHEFFIELD CORPORATION
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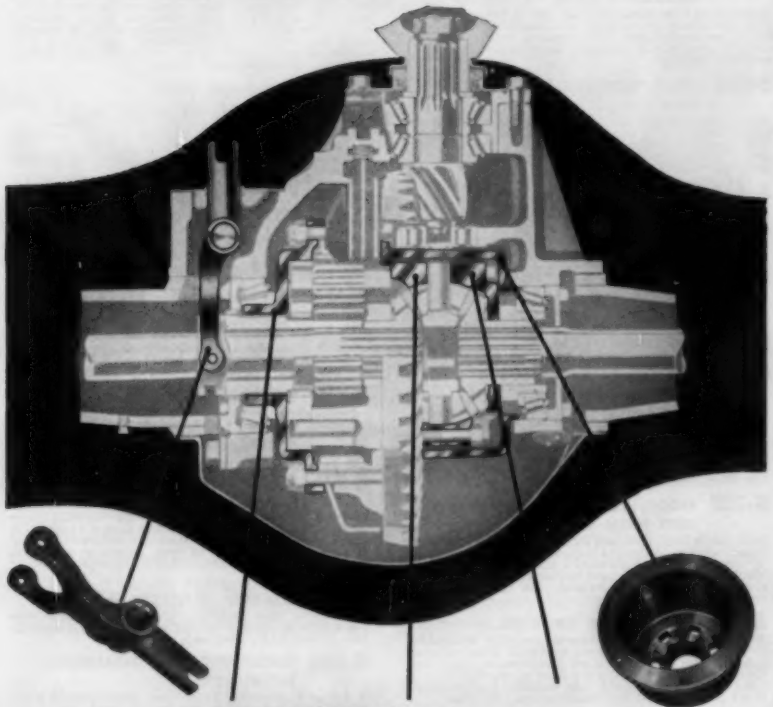


PEARLITIC MALLEABLE CASTINGS

The 2-speed truck axle is a *must* under varying load and road conditions because it provides a tailor-made ratio for every condition. But it takes a severe beating under heavy duty conditions encountered in logging, mining, farming, etc.

That's why Eaton Manufacturing Company, leading producer of 2-speed axles, specifies pearlitic malleable — from National — for several vital parts. For Eaton knows that pearlitic malleable has high ultimate strength . . . resists wear under heavy loads at high speeds . . . possesses excellent non-seizing properties. In addition, pearlitic malleable can be given a smooth finish . . . can be either liquid or air quenched. And perhaps *most important of all, pearlitic malleable machinability index ranges from 80 to 90* (B1112 steel = 100).

Look your product over critically. Pearlitic malleable castings—from National—can replace costlier fabrication methods . . . can offer opportunities of reduction in weight, machining and assembly time. AA-1197

Photos: Courtesy Eaton Manufacturing Company

NATIONAL MALLEABLE AND STEEL CASTINGS COMPANY

Cleveland 6, Ohio

The Nation's largest independent producer of malleable and pearlitic malleable

LETTERS

(Concluded from page 10)

statement means—applied to what and how?

For three long years now, we have been attempting to overcome the vast amount of mis-information that exists at working levels concerning anodic aluminum finishes. An article such as this only adds confusion to an already confused situation. After three long years of bucking-up against this problem, we have a tendency to be rather thin-skinned.

Howard A. Fromson
Fromson Orban Co. Inc.
New York

• *We did not present the information as being a new development, as we are aware that high-purity aluminum is being produced in this country. In answer to your questions:*

1. The article states: "It is not practical to plate the material."

2. The quotation of 43 cents a pound is a base price. We have no other details on it.

3. The German company itself reported the metal is applied like foil—we presume mechanically. The article mentions automobile bumpers, headlights, reflectors and trim.

One Way To Bend Hooks

I noticed an article, "High-Speed Bending" (Oct. 3, page 84) which interested me very much as we manufacture meat hooks. It tells about a semi-automatic high speed bending machine. Any information you could give regarding this machine would be appreciated.

Alex Zink
Plant Superintendent
Globe Co.
Chicago

• *Contact: Dave Wood, Publication Dept., Bethlehem Pacific Coast Steel Corp., 3631 E. Marginal Way, Seattle, Wash.*

Article is Enlightening

Your article, "What's Happening in Scrap" (Dec. 19, page 47), is most enlightening. Please send four copies.

William B. Crawford
President
Atlas Foundry Co.
Detroit

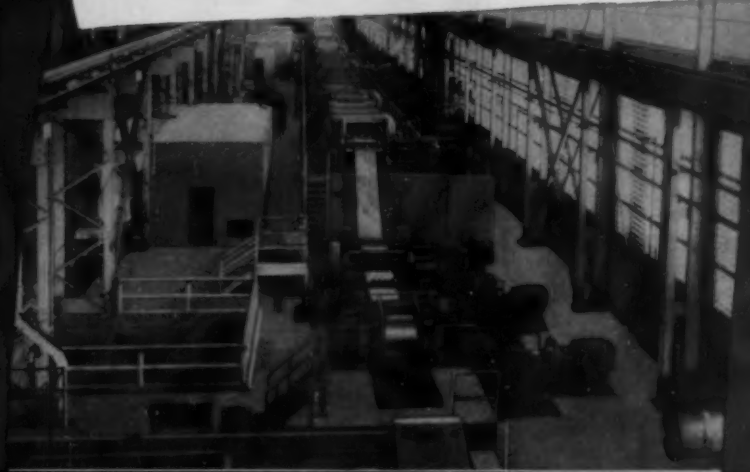
Pickling Without Acid

We were interested in the article, "No Acid in This Pickle Line" (Dec. 19, page 96). We would like additional information.

Clyde V. Prestowitz
Plant Engineer
Arcos Corp.
Philadelphia

• *Write: B. M. Pearson, Saxonhurst, North Bank, Hassocks, Sussex, England.*

"YOUNGSTOWN" EXPERIENCE PAYS OFF IN BETTER RESULTS FOR YOU



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SLAB PUSHER

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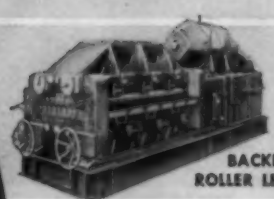
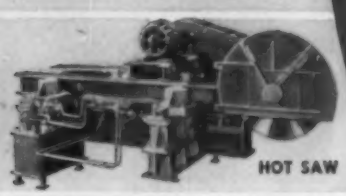


BACKED UP ROLLER LEVELER



HOT SAW

DUCTILE RUN-OUT TABLE ROLLS

"Youngstown" Machinery serves major steel mills from coast to coast

"Youngstown" is well-known for its 70 years of experience in the designing, engineering and building of heavy, steel mill machinery. Pictures at left show a few examples . . . Complete lines—major units and auxiliaries. Additional "YF&M" products include ductile iron gears, rolls and castings up to 100,000 pounds.

"Youngstown" also builds extrusion presses and equipment for the "light metals" industry.

Modern Pickling Line cuts costs for western mill

Better pickling with less acid consumption . . . "Youngstown's" latest high speed continuous strip pickling line utilizes a new pull-thru type TRIPLE SCALE BREAKER that eliminates the need for a pinch roll stand.

Complete Scrubber Line built for midwest plant

This typical sheet scrubber line provides the ideal solution to the cleaning problem involving enamel sheet stock, dry or oiled stock, sheets for tin plating and special service sheets.

36" Contour Roll Lathe wins laurels for new improvements

Completely hydraulic tracer control insures smoother, more accurate finish. Featured improvements provide better turning, either on necks or centers. Built to suit specific needs.

Slitting Line speeds production for brass manufacturer

This complete 25" slitting line for brass and copper is giving "right-for-the-job" service. "Youngstown" has the correct answer for any slitting problem, whether it is .002" brass, copper, aluminum, or ⅜" steel plate.

Ductile Run-out Table Rolls excel in hot strip mill

Ductile cast iron rolls are reducing maintenance in leading mills. Especially good under the sprays. Resist heat check and breakage. Ductile iron is the ideal maintenance material for aprons, roller boxes, looper tables and looper rolls.

Consult us about your problems.
Let us quote on your requirements.

The Youngstown Foundry & Machine Co.

SERVING INDUSTRY SINCE 1885

Youngstown, Ohio

Y F&M

PRIME MOVER. Here a wire belt is conveying pottery from a baking kiln to the decorating department. Wire belts, woven from CF&I-Wickwire Wire, are used to convey everything from heavy metal parts to fluffy foam rubber during processing operations.

CF&I-WICKWIRE MAKES WIRE FOR THOUSANDS OF USES

SHELF HELP for the housewife. These dish-washer shelves are made of selected low carbon rods of CF&I-Wickwire Refrigerator Shelf Wire. Specifications call for an extra-clean, smooth, bright surface for plating.

from making dishes for the manufacturer to washing them for the housewife... nothing can take the place of wire!

Wire can answer an almost incredible variety of needs because it can be varied to provide thousands of different combinations of mechanical and physical properties. From wire that can be easily twisted by hand to a rigid, self-supporting wire, it can be "tailor-made" to meet almost any set of requirements.

Whatever you assemble, manufacture, or process, let CF&I-Wickwire Wire help you do the job better, cheaper, and faster. You'll like doing business with CF&I-WICKWIRE and the careful attention given your own particular requirements.

CF&I-Wickwire Wire is made in plants conveniently located throughout the nation, from coast to coast. For detailed information, write our nearest district sales office.

WINDOW DRESSING. All kinds of draperies are hung on rods by means of strong, inexpensive drapery pins made from CF&I-Wickwire Drapery Pin Wire.

"RIBS" FOR HOSE. The rubber hose in grease guns is strengthened by basket-weave braided CF&I-Wickwire Hose Reinforcement Wire to help withstand high internal pressures. This wire is also used for rubber hoses in hydraulic brake lines and in hydraulic lines for aircraft.

FOR BACKYARD EXERCISE. These rake teeth are made of CF&I-Wickwire Rake Tine Steel Wire (flat scaleless tempered Spring Steel Wire).

ALL SECURE. The spring used in this lockset is made from extra-tough CF&I-Wickwire Lock Spring Steel Wire to insure long, dependable life.

3144

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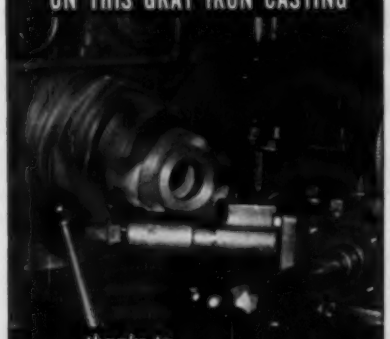

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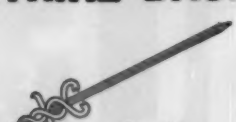

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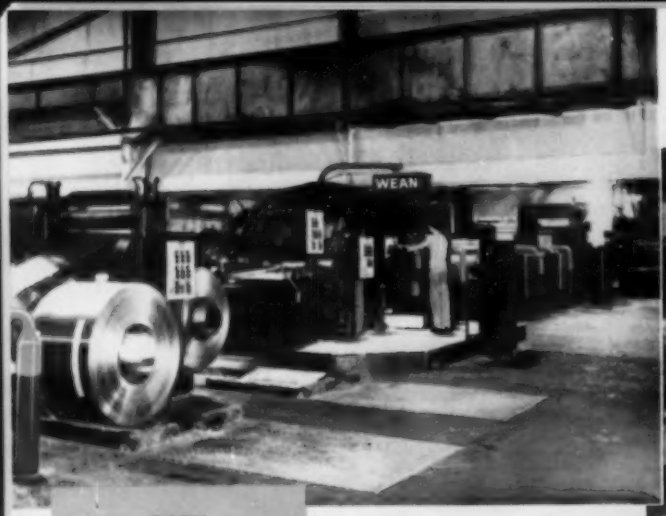

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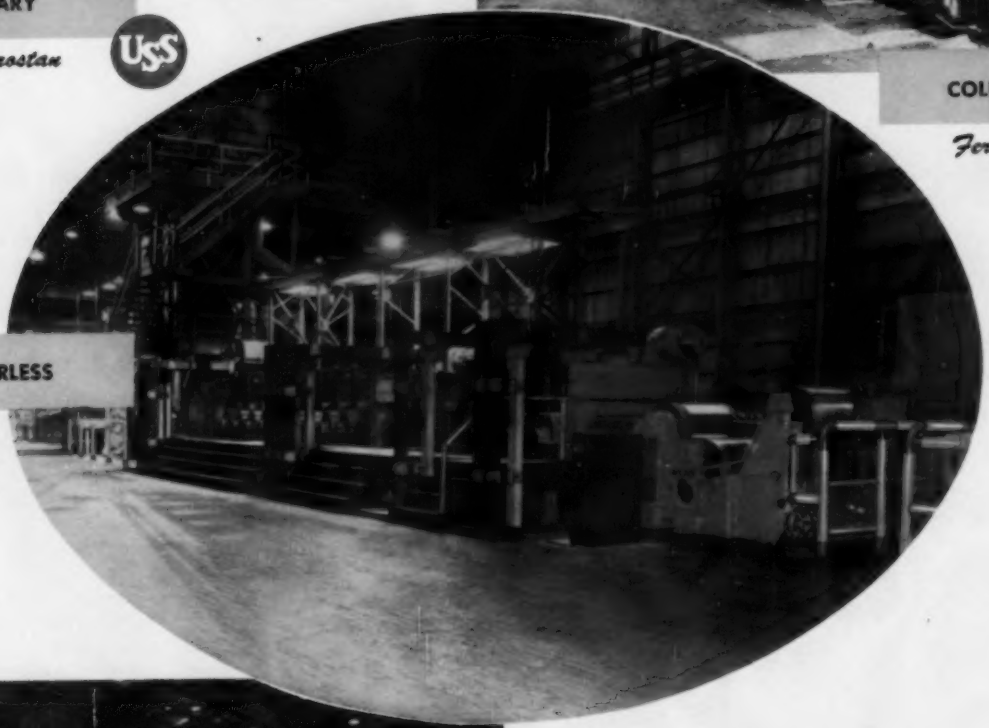

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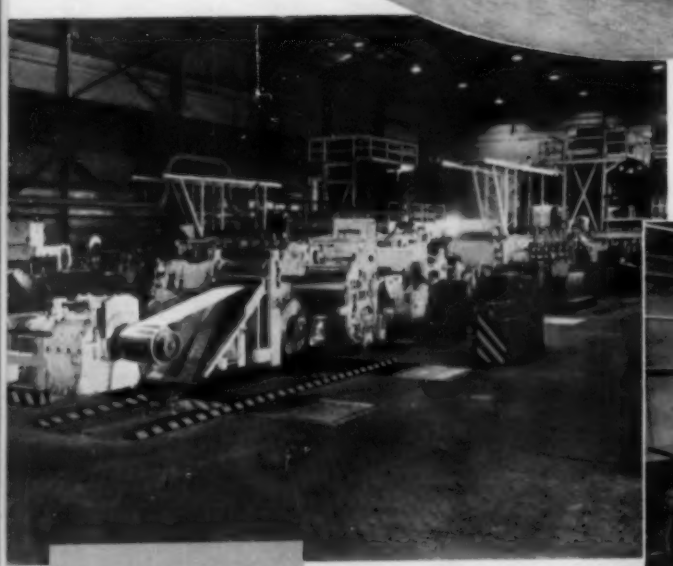

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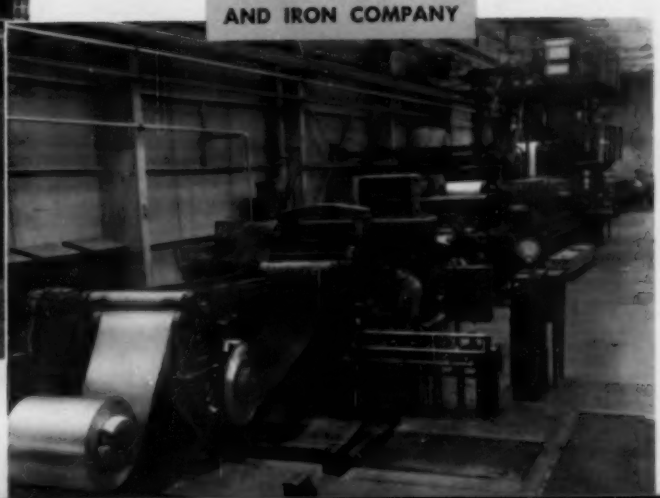

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. . . In addition to the 37 continuous electrolytic tinning lines already designed, built and delivered by Wean to leading tinplate producers the world over — ~~four~~ five more are now in various stages of completion.

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New Case "400" Tractor, shown here, is setting new standards of tractor capacity, convenience comfort, appearance and over-all performance.

Many parts of YOUNGSTOWN Steel go to make Case's "new from ground up" 400 Tractor

Not often does a farm equipment manufacturer create an entirely new tractor. Such a change is costly—both in time and in tooling costs. But, the J. I. Case Company of Racine, Wisconsin, did it with the Case "400" Tractor.

Another thing that Case did was to make sure that the "400" would be a quality product. That's why parts such as 4th and 8th speed gear seat reinforcement, rear axle shaft, differential shaft, reverse idler gear, front wheel spindle and many others are of Youngstown Steel. These parts utilize 5 different Youngstown Steel products: Hot Rolled Alloy Bars, Hot Rolled Carbon Bars, Hot Rolled Sheets, Cold Rolled Sheets and Standard Black Pipe.

In all Youngstown Steel products, you will find the same dependable uniformity, because Youngstown controls the complete manufacture from start to finish, with emphasis on quality throughout.

Let Youngstown help you with your steel problems. For information and service, get in touch with the local Youngstown distributor—or phone our nearest district sales office.

Youngstown

THE YOUNGSTOWN SHEET AND TUBE COMPANY *Manufacturers of Carbon, Alloy and Yoloy Steel*

General Offices Youngstown, Ohio District Sales Offices in Principal Cities.

SHEETS - STRIP - PLATES - STANDARD PIPE - LINE PIPE - OIL COUNTRY TUBULAR GOODS - CONDUIT AND EMT - MECHANICAL TUBING - COLD FINISHED BARS - HOT ROLLED BARS - WIRE - HOT ROLLED RODS - COKE TIN PLATE - ELECTROLYTIC TIN PLATE - BLACK PLATE - RAILROAD TRACK SPIKES - MINE ROOF BOLTS

New DoALL Demon High-Speed Steel Saw Blade.

MATERIAL
SAE 1045 HR Steel
5-1/16" Dia.
Rounds 1" Thick

96
Seconds
per Cut

12
Square Inches
Cut per Minute

36
Pieces
per Hour

432
Pieces per
Blade

.008"
Parallelism
±.015"
Thickness

KERF BONUS
Material Saved
27 Pieces

NOW!
CUT-OFF OPERATIONS ARE MAKING PROFITS

The performance records in industries using the new DoALL Demon High-Speed Steel Blade and Machine combination are the proof. These amazing records show that plants large and small make big profits on their cut-off operations because they do more accurate work faster and with less waste of material in meeting production schedules.

Here is just one typical example of DoALL Demon Saw Band and Machine efficiency that has set new standards for the industry.

SEE IT TODAY—Then you'll know how easy it will be to make your cut-off operations really profitable.

DoALL and Demon . . . Trade Mark The DoALL Company

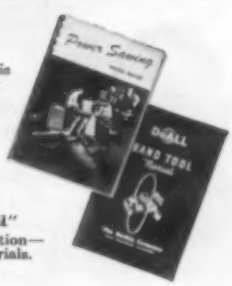
MACHINE
DoALL Power Saw
Model C-58 Automatic

Get your copy
"SAWING SAVINGS PROGRAM"
See how DoALL's personalized service is designed to save you money in all your sawing operations.

Free Handbooks

"POWER SAWING"
Cut-off sawing operations—108 pages of "how to do it" at lower costs.

"BAND TOOL MANUAL"
160 pages of saw selection—cutting rates for materials.



Local Saw Stock at your DoALL Store assures prompt delivery. You are invited to witness a free demonstration of the Demon Saw Bands cutting your material.

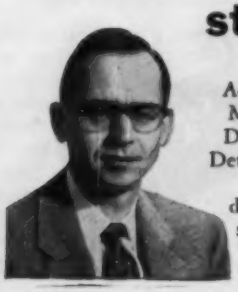
THE DoALL COMPANY
DES PLAINES, ILLINOIS
MAKERS OF BAND MACHINES and BLADES • They go together!

Machine Tools • Cutting Tools • Measuring Instruments • Surface Plates • Shop Supplies

Friendly DoALL *Stores* (in 38 cities)

Personalized Service • Complete Stock • Local Delivery

AIM* to make your products easier to handle and store with Acme Steel Strapping ideas



Acme Idea Man Marty Meehan, Detroit, advised Detroit Brass and Malleable in developing this steel strapping method.

ask your
*Acme Idea Man
to help solve your problems

Detroit Brass and Malleable Company did it with a new package and Acme Steel Strapping. (Idea No. S5-3.) Small boxes of iron pipe fittings are packed in larger fibre shipping containers. These are securely closed and reinforced with Acme Steel Strapping, the economical and efficient way to assure product protection and ease of handling.

The idea found enthusiastic customer acceptance, too. Formerly packed loose in bags, fittings were dumped into bins in warehouses and stores. Now, tightly strapped boxes are quickly stacked for storage. Inventory is easier . . . and there is more efficient use of warehouse space. Truck shipments are loaded and unloaded faster. Five steel strapped boxes can be moved at one time with a hand truck where formerly only one bag could be handled.

Ideas like this are being constantly introduced by your *Acme Idea Man and they extend to *every* industry. His ingenuity and experience are yours without obligation. Call your nearest Acme Steel office for an analysis of your shipping system. Or write Dept. GH-16 for further information.

ACME STEEL PRODUCTS DIVISION

ACME STEEL COMPANY

2840 ARCHER AVENUE, CHICAGO 8, ILLINOIS • ACME STEEL CO. OF CANADA, LTD., TORONTO

ACME STEEL

CALENDAR
OF MEETINGS

Jan. 23-24, Industrial Heating Equipment Association: Annual meeting, LaSalle hotel, Chicago. Association's address: Associations Bldg., Washington 6, D. C. Executive vice president: Carl L. Ipsen.

Jan. 23-25, Truck-Trailer Manufacturers Association Inc.: Annual meeting, Edgewater Gulf hotel, Edgewater Park, Miss. Association's address: 710 Albee Bldg., Washington 5, D. C. Managing director: John Hulse.

Jan. 23-26, Plant Maintenance & Engineering Show: Convention Hall, Philadelphia. Information: Clapp & Poliak Inc., 341 Madison Ave., New York 17, N. Y.

Jan. 24, Cutting Tool Manufacturers Association: Annual meeting, Detroit Yacht Club, Detroit. Association's address: 416 Penobscot Bldg., Detroit 26, Mich. Executive secretary: Martin J. Ewald.

Jan. 24-27, American Management Association: General management conference, Fairmont hotel, San Francisco. Association's adress: 330 W. 42nd St., New York 36, N. Y. Vice president-secretary: James O. Rice.

Jan. 26-27, Blast Furnace & Coke Association of the Chicago District: Winter meeting, Del Prado hotel, Chicago. Information: C. W. Bruce, chief engineer, Republic Steel Corp., 11600 S. Burley Ave., Chicago 17, Ill.

Jan. 28-Feb. 4, Industrial Diamond Association of America Inc.: Annual meeting, Hollywood Beach hotel, Hollywood Beach, Fla. Association's address: Box 175, Pompton Plains, N. J. Executive manager: Athos D. Leveridge.

Jan. 29-Feb. 2, Associated Equipment Distributors: Annual meeting and exhibit, Conrad Hilton hotel, Chicago. Association's address: 30 E. Cedar St., Chicago, Ill. Executive secretary: P. D. Hermann.

Jan. 30-Feb. 3, American Institute of Electrical Engineers: Winter general meeting, Hotel Statler, New York. Institute's address: 33 W. 39th St., New York 18, N. Y. Secretary: N. S. Hibshman.

Feb. 1-3, Midwest Welding Conference: Armour Research Foundation, Illinois Institute of Technology, Chicago. Information: Harry Schwartzbart, Armour Research Foundation, 35 W. 33rd St., Chicago 16, Ill.

Feb. 6-8, American Management Association: Marketing conference, Hotel Statler, New York. Association's address: 330 W. 42nd St., New York 36, N. Y. Vice president-secretary: James O. Rice.

Feb. 9-10, Steel Kitchen Cabinet Manufacturers Association, Spring meeting, Waldorf-Astoria, New York. Association's address: 1008 Engineers Bldg., Cleveland 14, O. Secretary: Arthur J. Tuscany Jr.

Feb. 13-17, American Society of Civil Engineers: Winter meeting, Baker hotel, Dallas, Tex. Society's address: 33 W. 39th St., New York, N. Y. Secretary: William N. Wisely.

Feb. 15-17, American Management Association: Personnel conference, Palmer House, Chicago. Association's address: 330 W. 42nd St., New York 36, N. Y. Vice president-secretary: James O. Rice.

Feb. 16-17, Drop Forging Association: Winter industry meeting, Park Sheraton hotel, New York. Association's address: 419 S. Walnut St., Lansing, Mich. Executive vice president: Edgar L. Harden.

Feb. 16-17, Eastern States Blast Furnace & Coke Oven Association: Winter meeting, William Penn hotel, Pittsburgh. Information: B. W. Norton, Shenango Furnace Co., Sharpsville, Pa.

Feb. 19-23, American Institute of Mining & Metallurgical Engineers: Annual meeting, Hotels Statler and New Yorker, New York. Institute's address: 29 W. 39th St., New York 18, N. Y. Secretary: E. O. Kirkendall.

Feb. 26-29, American Institute of Chemical Engineers: Winter meeting, Hotel Statler, Los Angeles. Institute's address: 120 E. 41st St., New York 17, N. Y. Secretary: P. J. Van Antwerpen.

THE ANSWER TO **your corrosion problems**

A completely new sixteen page bulletin on corrosion proof materials of construction. . . . Individual sections on CORROSION PROOF CEMENTS, PROTECTIVE COATINGS, TANK LININGS and RIGID PLASTIC STRUCTURES and PIPE . . . also sections including engineering design and corrosion resistance charts.
This bulletin is filled with valuable information on 18 materials that can be used to give you plant-wide protection from corrosion.

FOR YOUR COPY
WRITE TO

ATLAS MINERAL PRODUCTS COMPANY
MERTZTOWN, PENNSYLVANIA

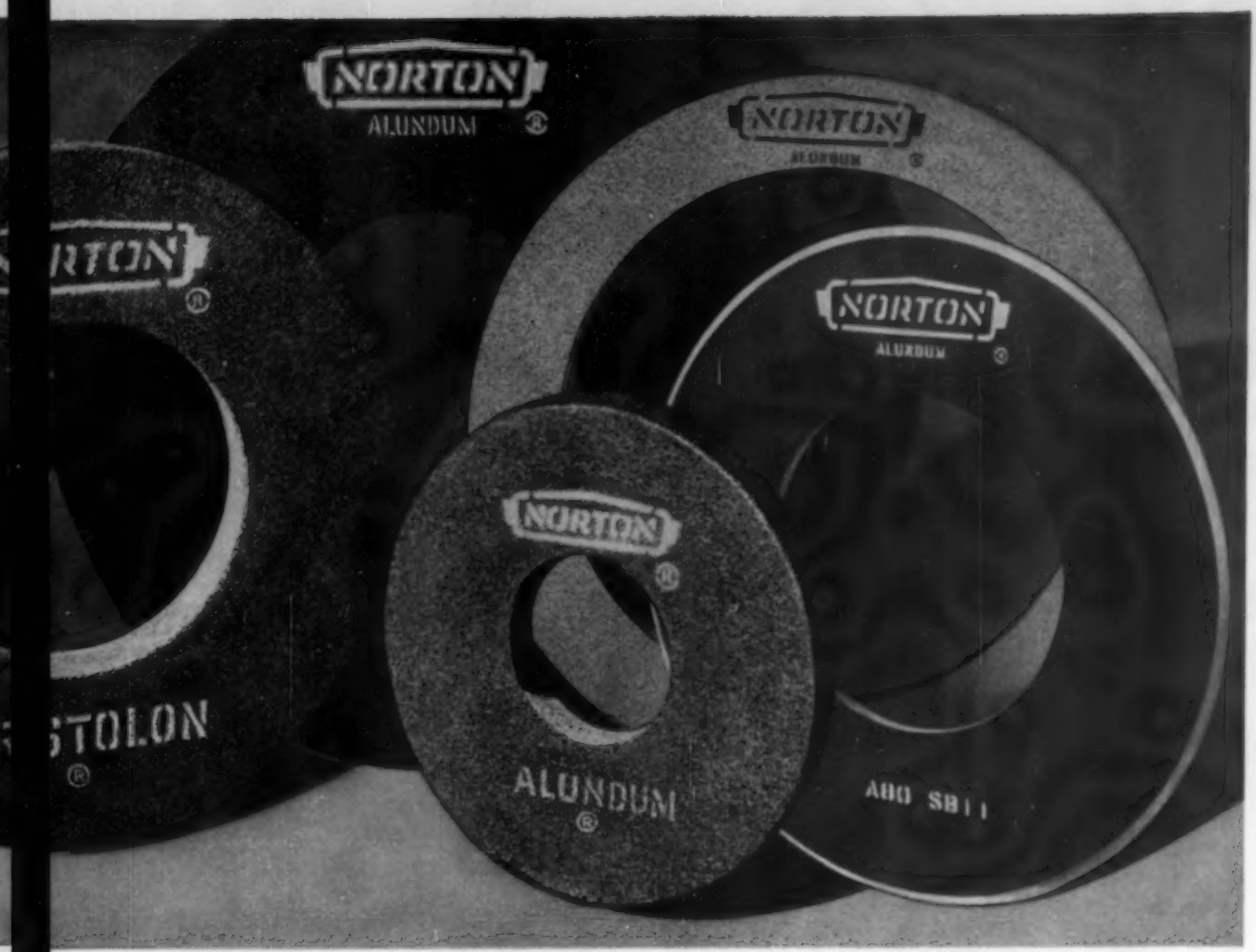
TECHNICAL REPRESENTATIVES THROUGHOUT THE UNITED STATES

Q. What's new in grinding?

A. B-11 resinoid-bonded wheels —for many grinding jobs

Q. What's new about B-11 wheels?

A. Their great new resinoid bond, improved uniformity and balance, new "TOUCH of GOLD" performance-benefits



Q. What is the B-11 bond?

A. It's the latest Norton resinoid bond. Wheels made with it are excellent for snagging, disc grinding, heavy weld grinding, thread grinding, cam grinding, centerless grinding, roll and surface grinding.

Q. Why?

A. Because B-11 wheels are more uniform in structure, with better balance. As a result, they grind cooler and faster. And on portable machines they "hug that work" closer, with less vibration and bounce.

Q. What about those "Touch of Gold" benefits?

A. They're the direct result of the B-11 wheels' more efficient grinding action. In precision grinding this means improved surface finish, greater accuracy, more pieces per dressing. In rough grinding it means less operator-fatigue and longer wheel life. All these benefits add up to more profitable grinding for you.

Q. Any other advantages of B-11 wheels?

A. Many others. For example you get closest possible duplication. Hardness increments are evenly spaced throughout the entire grade scale. And B-11 wheels can be supplied in half-grade increments, making it even easier for you to choose exactly the right wheel for every job.

Q. Sounds fine — what about more information?

A. Your Norton Distributor will gladly give you the whole story on the new B-11 wheels. Or write us direct. NORTON COMPANY, Worcester 6, Mass. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone book, yellow pages. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

W-1676

NORTON

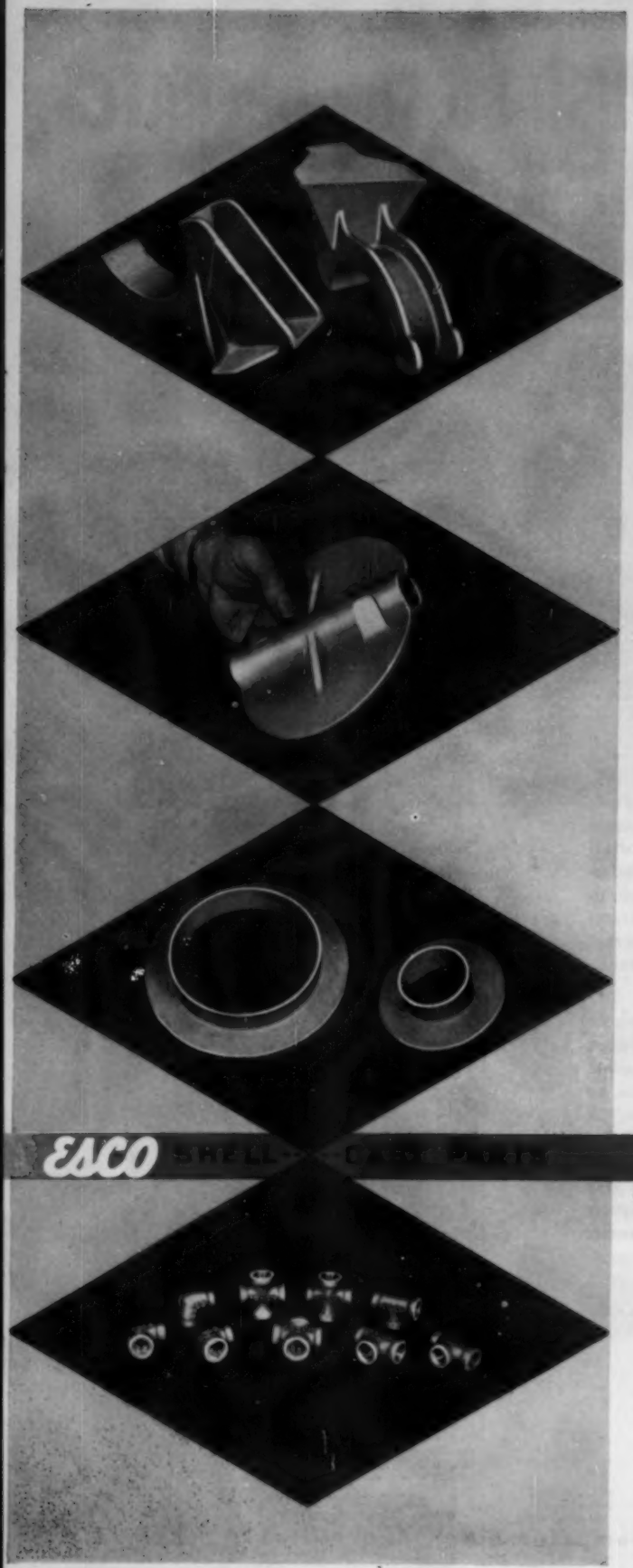
ABRASIVES

Making better products . . . to make your products better

NORTON COMPANY: Abrasives • Grinding Wheels • Grinding Machines • Refractories

BEHR-MANNING DIVISION: Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

look how
ESCO SHELL CAST
reduces your
production costs...
SAVINGS IN MACHINING COSTS—
Most machining operations can be simplified or eliminated entirely.
SAVINGS IN MATERIAL—
Shellcast parts can be poured to dimensional tolerances of plus or minus 0.010" per inch. Sections less than 1/8" can be Shellcast. Tremendous savings in material are made possible.
SMOOTHER SURFACE — BETTER APPEARANCE
if desired, castings may be buffed to satin or bright finishes without prior machining. You get a better looking, more saleable product.
GOOD REPRODUCTION OF DETAIL—
Shellcast often reproduces lettering so well that a separate nameplate is no longer needed. Intricate details of design, defying normal foundry mothods, can be Shellcast successfully.



ESCO SHELLCAST
IS A NEW CASTING TECHNIQUE . . .

that not only produces parts better, faster and at lower cost, but often makes substantial savings in basic production procedures. Smooth surfaces, with good reproduction of detail; uniform density, light weight . . . these are only a few Shellcast advantages that bring savings in materials, machine-finishing, and assembly. *ESCO* Shellcast is available in all low alloy steels, stainless steels and high alloys.

WRITE FOR
FREE BOOKLET
"CUT PRODUCTION COSTS
WITH
***ESCO* SHELLCAST"**

ESCO® **ELECTRIC STEEL FOUNDRY CO.**
2160 N. W. 25th AVENUE, PORTLAND, OREGON

( ) Send me a free copy of "Cut Production Costs With ESCO Shellcast".

( ) Have an application engineer call for an appointment.

Name_____

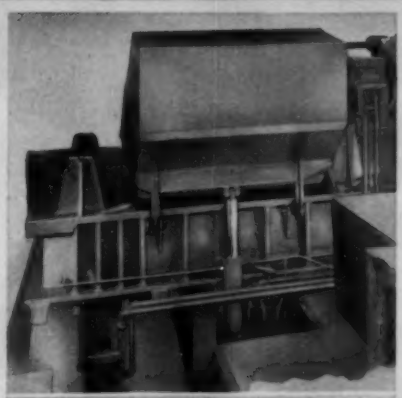
Company_____

Address_____

City_____ State_____

Now one man can PUSH-BUTTON-OPERATE one or several Dempster-Balesters!

1



2

3

ONE PRESS may be the Dempster-Balester Model 129. Another the Model 351. Another the Model 701, etc. Each may be the same model, or there may be several of one model, one of another. In addition, one or all may be fully equipped with exclusive Dempster-Balester Auxiliary-Compression Door that enables you to bale in a 1-2-3 continuous cycle. This Auxiliary-Compression Door does not "beat" or "tamp" the scrap. It actually penetrates into the charging box, hydraulically compressing the scrap with a 45-ton force!

Do you need one Dempster-Balester or several? What model? With or without Auxiliary-Compression Door? With or without push-button control panel? Should your press produce one particular size bale, or be equipped to produce different size bales? Isn't it time we got together? Tremendous savings are yours with the right press, properly engineered and equipped to meet your particular requirements. Ask us to give you complete information. *A product of Dempster Brothers, Inc. Sold in Canada by the W. P. Favorite Co., Ltd., 418 Main Street East, Hamilton, Ontario.*

DEMPSTER BALESTER®

Photo 1 shows push-button controlled Skip Pan loaded. Photo 2 shows it dumping scrap metal into charging box. When Skip Pan returns to be re-loaded, Charging Box Door moves out, pushing last bale forward, clear of charging box (see Photo 3). Bale ejector returns to lowered position. Pusher heads (rams) proceed to bale the scrap and then automatically retract. Charging Box Door opens, bale is ejected and Skip Pan, which has been re-loaded, is ready to dump another load into box for baling.

DEMPSTER BROTHERS, 616 Dempster Bldg., Knoxville 17, Tennessee

Unsurpassed-anywhere!

IT ALL COMES DOWN to one fact... that you can always count on Roebling high carbon flat spring steel to reduce preparation time, machine stoppages and rejects to a minimum. What's more, it's made as you want it... annealed, hard rolled untempered; scaleless tempered; tempered and polished, blued or strawed.

You *pay* for the best every time you buy flat spring steel. Make sure you *get* it. Specify Roebling. John A. Roebling's Sons Corporation, Trenton 2, N. J.

California giant Sequoias—largest of all trees.

ROEBLING

Subsidiary of The Colorado Fuel and Iron Corporation

ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. & 5 PITTSBURGH ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • ROCHESTER, 1 FLINT ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • ST. LOUIS, 3001 DELMAR BLVD • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, 19 RECTOR ST., NEW YORK

CECO-DROP does more forging per blow... makes more forgings per hour

The piston-lift gravity drop hammer with short stroke control

CHAMBERSBURG

THE HAMMER BUILDERS

CHAMBERSBURG ENGINEERING CO.

Builders of THE IMPACTER

"FORGING IN MID-AIR"

CHAMBERSBURG, PENNSYLVANIA

Up to 40% higher tightening torques — a feature of new High-Torque Unbrako socket set screws

RECOMMENDED SOCKET SET SCREW TIGHTENING TORQUES (Inch-Pounds)

SCREW SIZE	UNBRAKO	SET SCREW B	SET SCREW C	MINIMUM DIFFERENTIAL %
#4	5	3.9	3.5	28
#5	9	7.8	7.4	15
#6	9	7.8	7.4	15
#8	20	14.7	14.5	36
#10	33	26.5	25	25
1/4	87	62	60	40
5/16	165	122	125	32
3/8	290	198	225	29
7/16	430	309	350	23
1/2	620	460	500	24
5/8	1225	1106	1060	11
3/4	2125	1540	1800	18
7/8	5000	3660	4600	9
1	7000	5025	6500	8

Compare UNBRAKO-recommended tightening torques with those of ordinary socket set screws and you readily see why you can set an UNBRAKO and then forget it. The reasons are simple. UNBRAKOS have deeper sockets, which give you better purchase with the wrench; rounded socket corners, which eliminate the sharp corners where cracks start; fully formed threads, which make them stronger; and knurled cup points, which keep them tight.

Let's see just how the development of fully formed threads make the new High-Torque UNBRAKO stronger. The metal is compressed into the closely knit grain structure that you see in the illustration. The grain flow follows the contour of the threads. There are no straight lines along which shear can occur. An UNBRAKO retains its flow lines even when ground down to .010" below root diameter. Conversely, cut or ground threads have straight flow lines—lose thread form at root diameter.

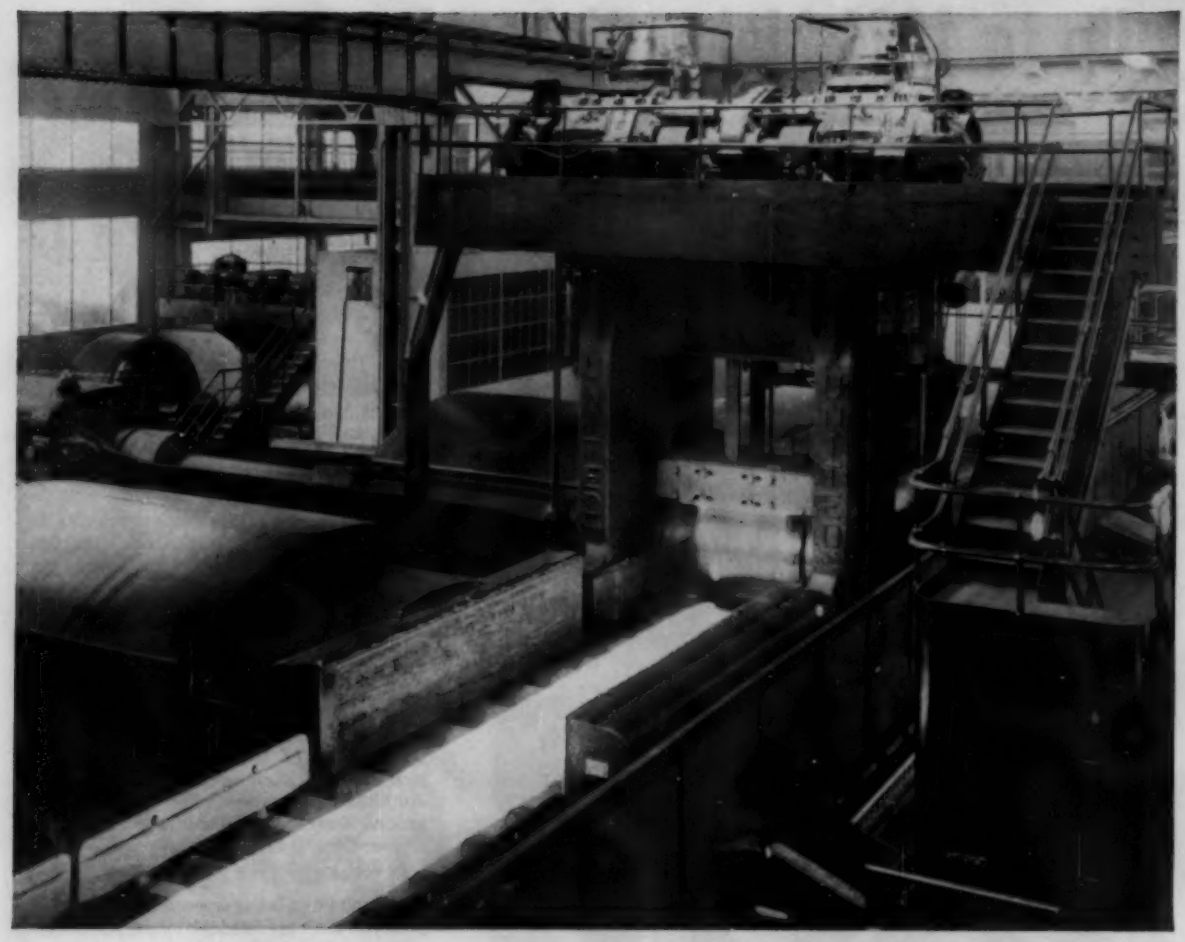
You can't buy a better screw than an UNBRAKO. And you can't get full *high-torque* performance without a "High-Titan" UNBRAKO Hex Key—the high-ductility, precision internal wrenching tool. See your authorized distributor today. Or write STANDARD PRESSED STEEL CO., Jenkintown 33, Pa.

STANDARD PRESSED STEEL CO.

UNBRAKO® SOCKET SCREW DIVISION SPS JENKINTOWN PENNSYLVANIA

UNBRAKO SET SCREW THREADS

ORDINARY SET SCREW THREADS



Your gear drives need this extra protection

ENCLOSED gear drives for roll stands get extra protection when lubricated with *Texaco Meropa Lubricant*. Here's why:

Texaco Meropa Lubricant embodies extreme pressure properties that toughen its lubricating film to withstand shocks and heavy duty loads far in excess of severe operating requirements of gears and bearings. These EP properties are notably longer lasting than those of other lubricants.

Texaco Meropa Lubricant contains polar additives that give it exceptional adhesive properties – it clings to the gear teeth under the most adverse conditions.

In addition, *Texaco Meropa Lubricant* is noted for its ability to resist heat-induced thickening. It will not foam and will not separate in use, storage or centrifuging. It is non-corrosive to gears and bearings.

A Texaco Lubrication Engineer will gladly give you full information. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

☆ ☆ ☆

The Texas Company, 135 East 42nd Street, New York 17, New York.

TEXACO

TEXACO Meropa Lubricants

FOR STEEL MILL GEAR DRIVES

TUNE IN: TEXACO STAR THEATER starring JIMMY DURANTE on TV Sat. nights. METROPOLITAN OPERA radio broadcasts Sat. afternoons.

STEEL

January 23, 1956

Metalworking Outlook

Union Targets

Major union targets in 1956 will be to boost wages, increase membership and influence politics more. Labor wants to keep strikes to a minimum in this Presidential election year, but major strike possibilities exist in steel, nonferrous metals, shipbuilding and aircraft. The pressure will be to peg wages at high rates before signs of a downturn appear. Union treasuries hold at least $4 million earmarked for membership drives, particularly in the South and among white-collar workers. In politics, labor will be active in Democratic circles. In national legislation, it will be less active than usual in this Presidential year, pursuing the policy of letting sleeping dogs lie.

Short Strikes in '56?

If there are major strikes in 1956, they're likely to be fairly short. That's the usual trend in good times. An average of only 10.2 days were lost by each worker who walked out in 1955, says Commerce Clearing House. That's a low mark for any postwar year. The average loss for the previous ten years was 15.5 man-days. Averages ran from 25.2 man-days in 1946 to 10.3 in 1951.

Unions in the Office

Nearly nine out of ten of the 787 respondents to the Conference Board's latest clerical salary survey indicate they have no unionized clerical employees. Unions believe a fertile field for organizing exists among white-collar people generally because five out of six aren't organized. Eight out of ten plant workers are. What's more, the average white-collar employee earns less than his blue-collar counterpart. An office worker earned $7 per week more than a shop worker in 1929, but $3 a week less in 1952.

FRB Index To Climb

Look for the Federal Reserve Board's industrial production index to average about 144 or 145 this year. That will compare with 139 per cent for 1955. Industrial production in December dropped seasonally to 141.

Corridor of Plants

"It is not at all visionary to look forward to the time when there will be a virtually continuous corridor of great plants between Akron and Cleveland. And this may come sooner than any of us can imagine." So predicts John E. Brennan, general manager of Chrysler Corp.'s Automotive Body Division. The occasion was the groundbreaking ceremony for Chrysler's

Technical Outlook—p. 69 Market Outlook—p. 101

new stamping plant at Twinsburg, O. Still another big facility to go up soon in the area will be General Motors Corp.'s factory near Hudson, O.

Construction Backlogs High

Order backlogs of the nation's leading engineering and construction firms are larger now than at any time since early in the Korean War. T. C. Williams, president of Stone & Webster Engineering Corp. and the National Constructors Association, says building costs may rise slightly this year, but not more than 3 to 5 per cent.

Tempest in Taxes

Despite the President's plea for no tax cuts and a balanced budget, watch for reductions in personal income taxes. The temptation to make the cuts will be too great for Congressmen to resist. Upward of 30 bills on the subject will be introduced in Congress. No reductions are likely in corporate taxes or excises.

Cost of Communicating

The average business executive spends 80 to 90 per cent of his time communicating, says American Management Association's Frank E. Fischer. Communication—trying to understand someone or trying to make him understand us—is the "X factor" that means the difference between success and mediocrity in the manager's job, according to Mr. Fischer. "It is perhaps the highest, the most exacting skill of management. Possibly it is also the most neglected." Management spends an estimated $112 million a year on publications in the field of communication alone, Mr. Fischer reports.

Replacement Appliances

Appliance dealers in 1956 will lean heavily upon replacement sales to bolster business. Their reasoning: Of the tremendous volume of appliances sold between 1950 and 1953, many are outdated, either in styling or mechanically. But a major hurdle to high replacement sales remains—no formal used appliance market exists. That's a problem currently engaging the attention of such top appliance executives as GM's Roger Kyes.

Straws in the Wind

GM President Harlow H. Curtice believes that consumer credit, and auto credit in particular, is causing undue anxiety in high places . . . The nation's inland waterways handled 87.5 billion ton-miles of traffic in 1955, a new record . . . Total nonfarm employment in December reached a record 58.3 million, topping a previous high attained last August . . . German Krupp interests are negotiating an $8.5-million deal to build a plant in Brazil for ultimate production of locomotives, farm tractors and heavy transport vehicles . . . Grace Line Inc. and the U.S. Maritime Board have signed an agreement under which Grace will build two large passenger ships and 24 other vessels (cost, $286 million) with government construction and operating subsidies.

Here's one reason why Michigan Tractor Shovels can move more yards per day, day after day . . .

USS MAN-TEN Steel provides extra strength and toughness in bucket and bucket boom

DESCRIBED AS "a bear for punishment and a hound for work" this big-yardage earth mover built by Clark Equipment Co., Construction Machinery Division, of Benton Harbor, Mich., is so engineered that every part contributes to high capacity operation and continuous, long-time service.

Use of USS MAN-TEN High Strength Steel in both bucket and bucket boom is typical of the care taken to ensure maximum durability and freedom from breakdown.

USS MAN-TEN Steel with a yield point of 50,000 psi—one and a half times that of ordinary carbon steel—readily provides the stamina needed to handle full buckets hour after hour. Its 40% higher fatigue strength safely absorbs shock and vibration when working the shovel into heavy, hard-to-dig material. Its greater abrasion resistance pays off in materially reducing bucket wear.

All these benefits inherent in USS MAN-TEN Steel combine to promote more dependable and more efficient shovel performance. They are obtained with no increase in weight, at little or no increase in cost.

Contact our nearest office and let us show you how you can apply USS MAN-TEN or our other High Strength Steels—USS COR-TEN and USS TRI-TEN—in place of carbon steel, to make your equipment *better*—able to do more work—able to last longer—with fewer stops for service and maintenance.

TO HELP YOU—Our "Design Manual for High Strength Steels" contains comprehensive and practical information that you will find extremely useful in designing your product for greater efficiency and economy by the sound use of high strength steels. For your free copy, write on your company letterhead, giving title or department, to United States Steel Corporation, Room 5132, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

UNITED STATES STEEL CORPORATION, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS MAN-TEN High Strength STEEL

6-298

UNITED STATES STEEL

Stainless castings show up to 190,000 psi strength after 875 F hardening treatment

Foundries report ultimate tensile strength as high as 190,000 psi in investment castings of Armco 17-4 PH Stainless Steel. This precipitation-hardening grade is easy to cast. It fills thin sections and details nicely, surface finish is good and tolerances small.

READILY MACHINABLE Armco 17-4 PH investment castings machine readily to an excellent surface finish. The subsequent 1-hour hardening treatment at 875 degrees F will not distort the part nor damage the surface. It causes only a slight discoloration.

NUMEROUS SUPPLIERS Armco does not make castings. If you are interested in high-strength, low-temperature hardening castings with high corrosion resistance, just fill out the coupon. We'll send you a list of suppliers of investment castings and other types made of Armco 17-4 PH Stainless Steel.

Armco Steel Corporation 1345 Curtis Street, Middletown, Ohio
Send me a list of producers of castings of Armco 17-4 PH Stainless Steel.

Name:_____

Firm:_____

Street:_____

City:_____ Zone:_____ State:_____

ARMCO STEEL CORPORATION 1345 CURTIS STREET, MIDDLETOWN, OHIO

SPECIAL STEELS

SHEFFIELD STEEL DIVISION • ARMCO DRAINAGE & METAL PRODUCTS, INC. • ARMCO INTERNATIONAL CORPORATION

Meeting the Challenge

One of our most vivid recollections of World War II is of a quiet, unassuming Russian engineer stationed in an American machine tool plant which was building equipment for an aircraft engine plant in the U.S.S.R. He was exceedingly intelligent and eager to get ideas that would be useful when he returned home.

From extensive evidence at hand, he is typical of the engineers and scientists at work in Soviet Russia today. This reservoir of talent is being filled at an average rate of 120,000 graduates a year. Within five years, it is estimated that the supply will exceed ours.

These are the people who will be the brains behind Russia's sixth 5-year plan. If all goes well, her pig iron capacity in 1960 will be increased a third to 53 million tons; steel capacity nearly a half to 68.3 million. Even larger increases are projected for coal, gas, oil and electric energy.

Much of Russia's technical manpower will be concentrating on better design and improved production methods. Work on aircraft, guided missiles, radar and atomic weapons is already comparable to ours. Electronic computers examined by American experts match our most advanced types. An American visiting a Russian ball-bearing plant said he had never seen a better example of automation.

Our steel capacity is twice what the Russians expect to have in 1960. By that time we will be able to make at least 145 million tons. We have adequate coal capacity and an exportable surplus. Low-cost gas from the Southwest is available in most industrial areas. Nearly 60,000 new oil wells will be drilled in 1956, and our power capacity is doubling every ten years. Our technical skills are producing new marvels in weapons and pushbuttonless factories.

But smugness is a luxury we can't afford.

The average citizen of Russia is accustomed to a lower standard of living than ours. Much of her technical and material resources can be directed to weapons. Productive efforts in democratic America are aimed chiefly at a steadily rising standard of living. Except in emergencies, defense has more or less taken a back seat.

In meeting the challenge of communism, we must learn to be as dedicated as the Russian engineer in the U. S. machine tool plant . . . building up and using our technical and material resources intelligently . . . being ever eager to get ideas which will further our dual cause: The maintenance of our democratic standard of living and a vigilant military establishment.

Irwin H. Such

EDITOR

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Whatever your tubing requirement—whatever kind and quantity you need—you can get quick delivery of a quality product with a single call to Ryerson.

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In stock: Bars, structurals, plates, sheets, tubing, alloy and stainless steel, reinforcing bars, machinery & tools, etc.

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How the Trigger Tool Program Will Work

1. Machine tool builders will have firm contracts from defense contractors. Contracts will automatically go into effect following an "event"—presumably an enemy attack or an official declaration that war is imminent. They'll be issued primarily for standard, general-purpose equipment needed to boost output of critical military goods quickly

2. Builders will know in advance exactly how many and what kind of tools they'll be asked to make. They will be able to plan for stand-by production equipment, component supplies, subcontracting and personnel needs

3. When contracts go into effect, work in process in tool builders' plants will be considered pool order production and will be shipped against rated orders. Priorities will be available for materials and labor

4. Builders will be asked to do their own financing. However, contracts are expected to offer sufficient basis for classification as government-guaranteed loans by private lending institutions

5. Business & Defense Services Administration hopes it can get at least 100 to 125 builders into the program. It would like more. It figures that initial trigger contracts would be completed in six to nine months of top-speed production

(Note: The Trigger Tool Program is unrelated to the Defense department's revamped reserve machine tool policy. For a description of this plan for government tool purchasing, see STEEL, Jan. 16, p. 39.)

Trigger Tool Plan Gets Set

THE NEW trigger contracts for machine tools will be awarded before June 30, if all goes well. Only a few technical details of the contract form remain to be ironed out.

The program is a big improvement over the old phantom order system of pre-Korean days. All a builder had then was "basis for agreement to make a contract." The trigger provision aims at getting production rolling without further negotiation between builder and government, avoiding possible delays caused by disrupted communications.

Checkup—Another feature will be continuing review by the Business & Defense Services Administration. It's estimated that between 9 and 18 months of production were lost during the Korean emergency because requirements were not kept up to date.

Tools contracted for will be needed for defense production; stockpiling is not an aim. Firm contracts will be in the hands of selected builders, to go into effect following an "event" (see above).

Financing—By getting their capital from private sources, builders may be able to borrow up to 100 per cent of their needs, rather than the maximum of 30 per cent available from the government.

Also, under the Defense Production Act, private financing must be unavailable before the government can advance even that 30 per cent, say officials from the General Services Administration and the Office of Defense Mobilization. They are working out the new program, along with BDSA and an industry task group.

Policy—Besides, they point out: "It would be poor public policy to firmly commit the government . . . to a disbursal of public funds . . . without the opportunity to evaluate the credit risk at the time of disbursement." Trigger contracts will run at least until June 30, 1963. If Congress extends DPA beyond the current June 30, 1956, deadline, they'll run longer.

The government feels that discouraging requests for the 30-percent advance won't keep many builders out of the program. Only one-fourth of those eligible for the advance during the Korean War asked for it.

Details — Orders for the tools will be placed by defense contractors, not the U. S. If a contractor should cancel when a tool is partially completed because of a shift in defense requirements, the tool could either be used to fill another order or turned over to GSA for storage until it's needed.

If GSA takes over the tool, the builder will be paid 82.5 per cent of the price then. The balance would be forthcoming when the tool was taken out of GSA storage and turned over to a defense user.

Safeguard — Contracts will protect builders from "beyond-their-control" delays in contract completion. Still in mind is the squeeze some builders felt during the Korean War when skilled workers were lured away by substantially higher pay offers from other defense industries.

Illinois Central Orders

Illinois Central Railroad will acquire 2000 new freight cars by the end of 1956 at a cost of $13.2 million. This is the largest single order for cars placed by the road since 1947. The cars will be built in Illinois Central shops. Construction will begin about Mar. 1.

Guides for College Recruiting

DO

1. Be honest and objective about the job and its opportunities.
2. Be specific about the job you offer.
3. Have a substantial man represent you as a recruiter.
4. Use common sense and courtesy in dealing with prospects.
5. Be prepared to answer common questions from students. Certain to be asked: What are opportunities for advancement?
6. Know the salary range being offered to graduates (the 1956 average: $400 a month for engineers; $375 to $400 for nonengineers).
7. Inform the prospect and the college placement officer promptly of your decision, pro or con.
8. Try to find some faculty member with whom you can discuss likely prospects.

BUT DON'T

1. By-pass the college placement officer in seeking job candidates.
2. Send more than two recruiters to each college, although it's helpful to have a team of a half dozen or more to handle the whole recruiting job.
3. Spread yourself too thin and go to too many colleges.
4. Use plush overselling on prospects; it may impress the inexperienced student, but not for long.
5. Insist on talking only to those students in the upper levels of their class; there's little correlation between grades and industrial success.
6. Insist on talking only to those students exempt from military service; 75 per cent of prospects still face military call.
7. Spend all your interview time questioning the student; most prospects are uninformed about your company, so tell them a little about yourself.
8. Forget the liberal arts graduates and concentrate only on the specialized engineering and business administration men.

More College Recruiting?

MORE THAN 65 years ago George Westinghouse, the inventor, started the first college recruiting by industry.

By 1939, 800 companies were recruiting on a formal basis. Today, 5300 are competing for the estimated 290,000 who will receive bachelor degrees in 1956, and especially for the 30,000 of those who are specializing in engineering.

Paradox—"Despite the increasing number of companies that recruit, we don't see enough of the small and medium-sized firms," says Arthur E. Bach, placement director for Case Institute of Technology. "Those firms need not worry about the competition for graduates because every year we have men who prefer to go with such a company. Other college placement officials tell me the same is true at their institutions."

But college recruiting costs money, probably from $300 to $500 per man hired. That includes the expenses and salary for the recruiter who visits the campus, the cost of literature about the company and the expenses connected with having a prospect visit your plant. Is that money well spent? "All I know," says Stacy Black, staff director for executive development at Thompson Products Inc., "is that it would cost more *not* to do it." Listen to E. L. Yates, director of college and university relations for General Motors Corp.: "We believe we can hire better men when we recruit them on campuses. We will continue the practice even when there's no longer a shortage of graduates."

Safeguard—Comments a placement man for a Big Ten school: "It's getting to a point where a company must recruit to keep up its manpower resources, and that applies to small firms as well as large."

The mechanics of recruiting are

simple. In July, send out letters to the colleges you wish to visit. Write to the placement director. It's rare these days for a school not to have one. Give details about your company and about the specific job requirements you have in mind. Be specific about the educational background you prefer. Indicate whether you will have continuing job opportunities over the years for graduates.

Matter of Dates—In the letter ask for mutually convenient dates when you can visit the campus. Hardly two schools in the country have identical recruiting periods. A handy guide on the matter is put out by *Journal of College Placement*, 2237 Fidelity-Philadelphia Trust Bldg., Philadelphia. Most seasons run from about Nov. 1 to April or May.

Two or three weeks before the date decided upon, send the placement officer literature about your company. A special recruiting booklet isn't necessary, although many companies have them. Copies of your annual report and sales and product literature are usually all that's needed.

Reminder—In your letter accompanying that material, remind the placement official that you're coming and ask how many interviewees you can expect. Ten or so is the average number, although one man can probably handle 12 or more in a day. Good placement officers rough-screen prospects to the extent of going to card files and picking people with the right educational and job-interest backgrounds.

When you get on campus, count on interviews of 20 or 30 minutes. Although you have sent your literature, the prospect is rare who has studied it carefully. So, you'll have to spend a third to half your interview talking about your company. Fortunately, most schools provide the recruiter with a personnel card which provides the vital statistics about the student, and that saves some time. Frequently you may keep, or at least borrow, the card.

For the Record—After the interview, it's well to keep a record. Glidden Co. has one that allows a quick check on the man as to whether he's below average, average, above average or outstanding in appearance, personality, voice and speech, intelligence, attitude, health and habits, personal affairs, education and military service, experience, abilities, ambition and development.

On the matter of military service, it's best to ignore it as a factor in deciding to hire. Some 75 per cent of all the young men you will interview on campus will still have their military service ahead of them. For the first two or three years of recruiting, you will be hard hit by it, but after that the averages will even out. Some of the young men you signed up two or three years ago will be coming back to civilian life.

RSVP—When you get back to your company, make your decision as soon as possible, and inform both the placement officer and the individual involved. In addition to the interview itself, you should base your decision, if possible, on a discussion about the man with the placement director and a professor who knows him.

If your decision is favorable, it should rarely be an outright offer of employment at this stage. The prospect probably wouldn't accept without a visit to your company.

The Visit—For convenience and economy, try to have prospects come in groups. Your company customarily pays their expenses. At Reliance Electric & Engineering Co., R. H. Smith, secretary, organizes the visits this way:

1. First, review the objectives of the day at a group meeting.

2. Conduct fairly extensive plant tours to give the prospects an idea of your products and how they're used.

3. Have prospects meet at least two top men in the major departments. These men should tell what their department does and how it ties in with the others.

4. Usually include some aptitude-interest testing.

Problem—A common fault in college recruiting is to spread yourself too thin—visit too many campuses. One company saw 60 colleges a year but got 85 per cent of its men from five colleges.

Another problem is the difficulty in meeting your goals. Even General Motors figures itself lucky to hit its requirements. It will interview nearly 6000 young men this year on 125 campuses. It will recommend about 2000 for hiring, but it expects to hire only about 1700—900 engineers, 400 business administration people and 400 liberal arts graduates.

Reforms Needed—"We all need to do a better job of recruiting," says J. R. Clarke, director of industrial relations for Stewart-Warner Corp. "On the average only one out of five graduates interviewed is of interest to the company representative, and only one out of two of these is offered a job. Generally, too, only one out of three students offered jobs accepts that company's offer."

• *Extra copies of this article are available in quantities from one to three until supply is exhausted. Write Editorial Service,* STEEL, *Penton Bldg., Cleveland 13, O.*

Help from the College Placement Officer

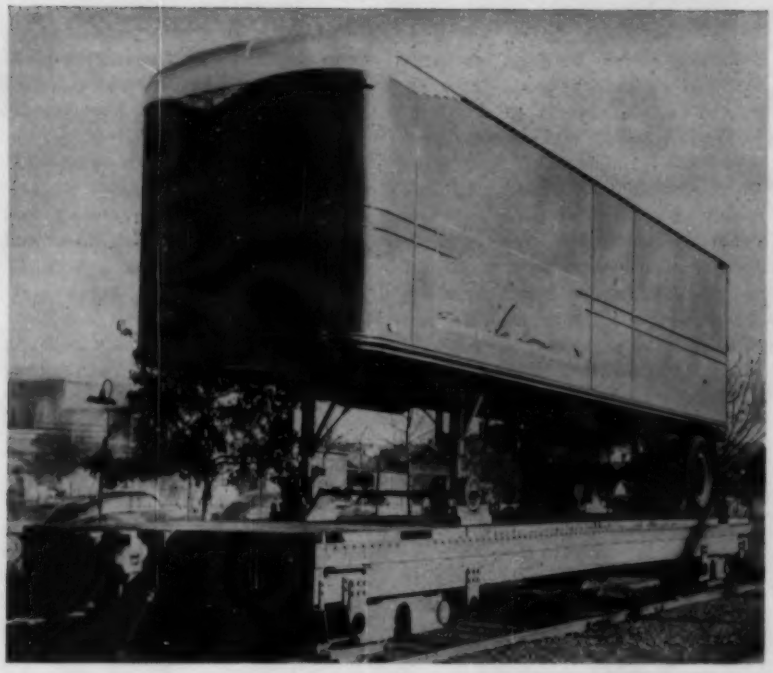
These officials are doing yeoman service for industry, but here are some suggestions on how they can improve their service:

1. Know more about the companies that recruit.

2. Visit the plants of some of the recruiters.

3. Do a better job of screening prospects for recruiters. Some officers are doing a brilliant job, but others don't screen at all.

4. Adopt a standard student data sheet, such as that suggested by the Midwest College Placement Association. It would help companies that recruit at many schools.



New car gives a passenger ride to freight

ACF Builds New Car

ORDERS are highballing for the railroad car introduced this month by the American Car & Foundry Division, ACF Industries Inc., New York.

First railroad to buy the interchangeable, lightweight cars is the Rock Island. Its order is for 50 basic cars with box compartments to be delivered about midyear.

Trailer Train Co. has ordered 1000 of the flat cars. They'll be used to transport highway truck trailers in the "on-line" and interchange piggyback service.

New Design, New Savings — Weight and cost of the car, the Adapto, are about one-half that of standard cars. The Adapto's capacity is 70,000 lb, about 70 per cent that of conventional cars.

Dead weight is reduced nearly 35 per cent. An average freight train of conventional cars outweighs an equivalent Adapto train by as much as 800 tons. ACF claims this means a cost saving with an Adapto train of $4000 on a 1000-mile haul (assuming a cost of 0.5 cent a ton-mile).

The new four-wheel, 35-ft long car has fixed axles, air-cushioned suspension, roller bearings and a self-cleaning floor.

The basic design is suited for box, container-hopper, gondola, refrigerator, tank or hopper car, caboose and piggyback service. The key feature is the fast interchangeability from one service to another.

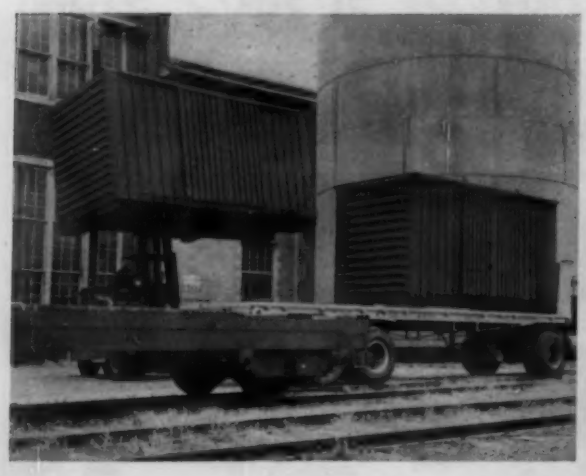
Railroads can make the components readily available at freight terminals for quick conversion to the shippers' needs.

Speed—The box car can be made of two 17-ft containers or four 8-ft containers. Unloading is fast —a crane or a fork lift truck can lift these sections off the flat cars and onto waiting trailer trucks.

The easy unloading and the convertible features are expected to cut idle time of cars in terminals and sidings. Also anticipated: Reduced switching and car handling costs in classification yards.

ACF will supply the containers, tanks, gondolas, hoppers and other structures plus the flatcar.

A Team—ACF has joined with



It takes but one unloading for plants without a rail siding

Switching is eliminated by lifting containers to trucks

Fruehauf Trailer Co. in making a complete sales package for piggybacking. A joint engineering and sales force, including men from both ACF and Fruehauf, will help solve piggyback problems.

The sales team will recommend the number of trailers needed for each car after studying the type of freight, length of hauls and the area of the operation.

ACF points out that the new car need never travel empty—a railroad can send a 35-ft trailer on the basic flat car to its destination, then convert the same car into a two-compartment box car.

Carrier To Supply Levittown

The trend toward home air conditioning systems received a whopping boost Jan. 4, when Carrier Corp. signed with Levitt & Sons Inc. to install central air conditioning systems in 702 homes to be built in Levittown, Pa.

Cloud Wampler, Carrier's chairman and president, described the contract as "the air conditioning industry's major breakthrough into the volume housing market." Mr. Wampler noted that it was "the largest single order ever signed for residential air conditioning."

In 1952 the air conditioning industry sold 15,000 central residential systems; sales in 1955 were over 125,000. Mr. Wampler predicted 200,000 in 1956, and half a million by 1960.

Detroit Steel Boosts Capacity

Detroit Steel Corp.'s No. 1 blast furnace has resumed operations at Portsmouth, O. This marks another step in the company's $75-million modernization and expansion program at its Portsmouth Division.

Rebuilt at a cost of about $1.25 million, the blast furnace has an estimated capacity of 264,000 net tons of pig iron annually. The furnace was shut down when Detroit Steel started up its No. 2 blast furnace. Its annual capacity is more than 500,000 tons. With the two units in operation, the company can produce about 768,600 net tons annually, not 264,000 tons as erroneously stated in STEEL, Jan. 9.

Steel: 15 Million Tons More

An AISI survey reveals that much added ingot capacity is planned over the next three years. Average cost: About $200 per ton. Industry will spend $1.2 billion in 1956

THE STEEL industry plans to add 15 million tons of steelmaking capacity in the next three years.

The American Iron & Steel Institute's president, Benjamin F. Fairless, points out that this expansion will be at an annual rate of 5 million tons, compared with a 3.5-million annual rate over the last ten years. The three-year period that ended with 1955 witnessed an expansion of 10.8 million tons.

More To Come—The new program, as revealed by a survey just completed by the institute, will bring steelmaking capacity up to 143 million tons by the end of 1958, with still more to come.

Steel's greatest problem, says Mr. Fairless, will be to get the money to carry out the expansion. He estimates that the cost of this three-year increase will average about $200 per ton. Completely new facilities will cost more than $300 per ton, but additions are less expensive. This year alone, steel companies plan to spend $1.2 billion.

Up, Up, Up—Steel ingot capacity as of Jan. 1, 1956, was 128,363,090 net tons. That's over 2.5 million more tons than one year earlier and 36 million more tons than at the end of World War II. The relative standings of the ten largest steel companies were not changed by 1955 programs (see table below).

Other companies that added more than 100,000 tons to their ingot capacities last year were Atlantic Steel Co., 150,000 tons; Ford Motor Co., 122,000 tons; McLouth Steel Corp., 180,000 tons; Sharon Steel Corp., 213,000 tons; and Northeastern Steel Corp., 115,000 tons. Northeastern is a new firm that expanded the capacity of the old Stanley Works from 188,280 tons to 303,200 tons.

New Crucible Steel Mill

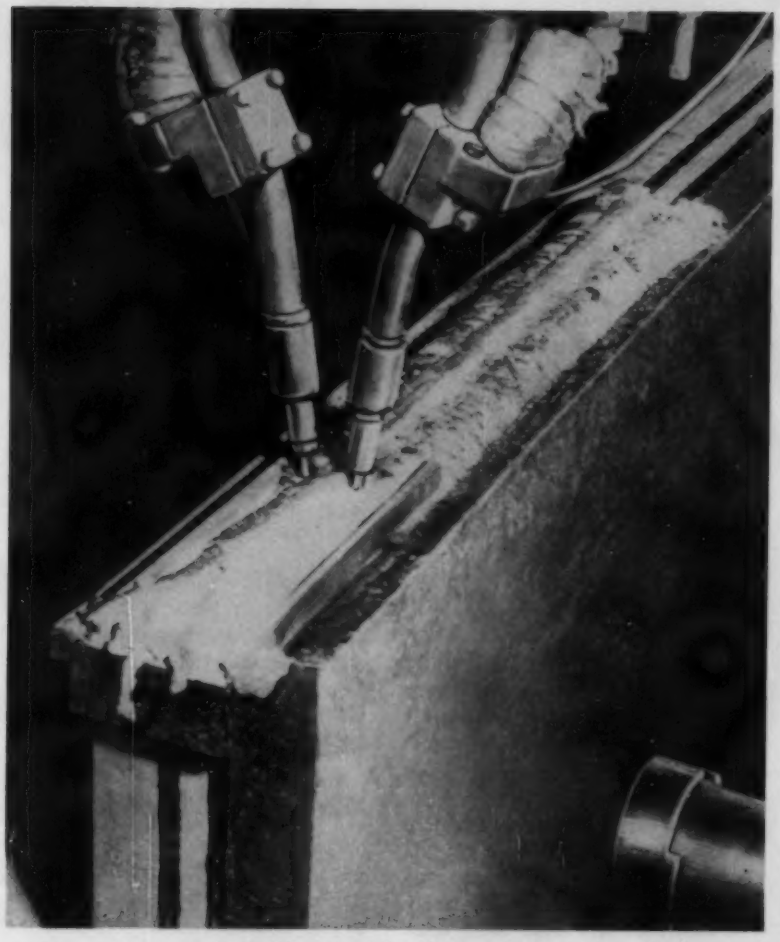
Crucible Steel Co. of America will install a $2.5 million 50-in. Sendzimir reversing cluster mill at its Midland, Pa. Works.

For cold rolling stainless and titanium strip to thinner gages than the firm has previously produced, the mill will be the largest ever built for this purpose, a company official stated. Installation is scheduled for completion in 1957.

The Ten Largest Steel Companies

(Ingot Capacity in Net Tons)

	Jan. 1 1956	Change in One Year
U.S. Steel Corp.	39,215,000	338,000
Bethlehem Steel Corp.	20,000,000	900,000
Republic Steel Corp.	10,262,000	——
Jones & Laughlin Steel Corp.	6,166,500	——
National Steel Corp.	6,000,000	——
Youngstown Sheet & Tube Co.	5,750,000	230,000
Inland Steel Co.	5,200,000	200,000
Armco Steel Corp.	5,150,000	200,000
Colorado Fuel & Iron Corp.	2,514,500	43,000
Wheeling Steel Corp.	2,130,000	——



A clad "sandwich" at Lukens Steel Co. is welded around the perimeter. This protects the cladding surface and prevents slippage during processing

Clad Metals Show Big Gains

IF YOU'RE LOOKING for a way to cut costs on stainless, copper, aluminum or any number of other sheet metals, clad metal may be your answer.

This combination of two or more dissimilar metals may also be a partial answer to conserving precious supplies of nickel, copper and aluminum.

Pros and Cons—The 15 or 20 producers of clad metals claim their products can combine the best qualities of the original bonded metals, resulting often in a product easier to work or more durable than the separate sheets. But no one claims clad metals are suitable for all applications.

If cladding can be used, costs can be cut as much as a third. Lukens Steel Co., Coatesville, Pa., says solid Type 304 stainless steel will cost about $890 a ton base price. But 20-per-cent Type 304 stainless clad on carbon steel will cost only $654 per ton, a saving of $236. In addition, there's a saving of 80 per cent on the stainless, an important consideration during the nickel shortage.

Typical—The example is typical of most clad metals. Savings vary with the metal and the thickness of the cladding. Producers say that most cladding thicknesses are 10 or 20 per cent of the total thickness of the clad sheet or plate. But 5 to 50 per cent can be obtained.

This industry is comparatively young, starting about 1930 with nickel clad on carbon steel. Since then, most of the common metals have been successfully clad (such as copper, aluminum, stainless, Monel, Inconel and silver on carbon steel or one of the other metals). Researchers are delving into the economic and technical problems of cladding such metals as zirconium, tantalum and titanium. They and some of the commonly used clad metals may have important roles in atomic energy installations.

Expanding Markets—Most consumers come in contact with clad metals in pots and pans, where weight, improved heat transfer and cost are important factors. American Silver Co., Flushing, N. Y., says its big customers are in the aircraft, electronic, chemical and automotive industries. Other producers report that as nickel, copper and aluminum become more scarce and expensive, they get more inquiries from new industries about the possibility of using those metals in clad form. A wide range of thicknesses is available. American Silver rolls thermostat metals down to 0.001-in. Lukens has rolled clad plate as thick as 8⅝-in.

Shortages and technological advances have resulted in a tonnage growth of more than 2000 per cent since 1939. Since 1946, when stainless clad was introduced, use has increased 300 per cent.

Advantages—Lukens claims clad steels have eight advantages for the fabricator: 1. Low cost. 2. Design freedom because of easy workability. 3. Structural stability. 4. Low maintenance cost. 5. Ease of modification. 6. Fast heat transfer. 7. Long life. 8. ASME code permits full gage consideration. Other clad metals have many of these advantages.

New SBA Limited Loan Policy

To help keep small job shops and machine shops out of the bankruptcy courts, the Small Business Administration has set up a Limited Loan Participation Plan in southern California and Arizona. Loans can be up to $15,000 in government funds plus a share from the borrower's bank.

Defense Hard Goods Spending Slips

(Fiscal Year In Millions)

Category	1955 actual	1956 estimated	1957 estimated	Recommended new obligational authority for 1957
Aircraft	$8,037	$6,880	$6,751	$5,315
Ships	1,009	955	1,032	1,336
Guided Missiles	631	918	1,276	1,776
Military Public Works	1,582	1,899	1,817	1,702
Other	3,319	3,070	2,659	1,878
Totals	14,578	13,722	13,535	12,007

Though some outlays dip, metalworking may get more as . . .

Ike Maps Spending Plans

A LOOK at President Eisenhower's proposed budget reveals this prospect for fiscal 1957:

Ike is asking for $65.9 billion, up $1.6 billion from 1956. Higher federal spending will mean more for metalworking.

Defense—The lion's share of outlays is planned for major national security programs. Spending is forecast at $40.4 billion, $903 million more than in 1956. Emphasized will be air-atomic power, guided missiles and other means of continental defense. Re-equipment of the armed services with the latest weapons also is high on the list.

Though spending for military hard goods by the Defense department will be slightly down (see table), that's not the case for total Defense department outlays. They will be up $900 million. And even in the hard goods category, it's often a shift of emphasis. Aircraft spending will be off $129 million, guided missile spending will be up $358 million, for the highest total in history, double its 1955 value.

Science — Federal research and development requests for fiscal 1957 are estimated at $2.6 billion, up $301 million over 1956. Major emphasis will be placed on projects related to continental air defense, nuclear propulsion of aircraft and ships.

The President's program for atomic energy would continue to increase the nuclear weapons stockpile. At the same time, it calls for speeding the development of peaceful atom applications. Spending on atomic energy is slated at a record $1.9 billion, $230 million more than in fiscal 1956.

Shipbuilding — Ike's proposals call for more Navy shipbuilding. On tap are a sixth carrier of the *Forrestal* class, additional nuclear subs, destroyers and frigates equipped to carry guided missiles, and an experimental nuclear cruiser. Development of a practical nuclear powerplant for installation in ships of the large carrier class will be pushed.

Expenditures for electronic and communication equipment are to remain high. Ammunition, combat vehicles, trucks and other major military equipment items will receive less attention. Requirements for such items are largely met.

Stockpile — It's recommended that the Defense Production Act be extended for another two years. Stockpiling, though, will dwindle. An increasing number of goals are nearing completion; tight supply of some materials (chiefly nickel, copper and aluminum) requires that they be diverted to meet shortages in key industries.

Also recommended in the budget message are: Legislative action and increased appropriations to improve and expand basic transportation facilities, especially the interstate highway system, federal airway system, federally operated waterways, navigation aids and the merchant fleet. Funds for construction subsidies for 22 new ships and trade-in allowances for ships replaced are suggested.

Housing—The budget contains a large section on housing. Measures are suggested to encourage private financing to assure continued high levels of building. The public housing program calls for constructing 35,000 units a year for the next two years.

Higher patent fees and a larger appropriation are the basis for an eight-year program designed to clear the jam of applications at the Patent Office. Relief for distressed areas is also in the news, an experimental reinsurance program and expansion of Small Business Administration's disaster loan authority being possible measures.

Government—The President also wants to triple the staff of the Federal Trade Commission charged with enforcing controls over corporate mergers and provide for more adequate review by Securities & Exchange Commission of the vast new capital offerings and increased trading in securities.

He recommends no changes in present excise and corporation income taxes; no tax reduction at all if it threatens to unbalance the budget.

Key—And that's the crux of the situation. Budget receipts are figured at $66.3 billion in fiscal 1957. That's more than sufficient to sustain the President's program. But it doesn't leave any room for tax cuts. Politics may give rise to attempts to pare the proposals by about $2 billion to permit a token reduction.

Protecting industry from advanced weapons is one goal of . . .

ODM's New Dispersal Guide

INDUSTRIAL DISPERSAL receives new, stepped-up attention from government defense planners.

Likely to result from the latest Office of Defense Mobilization action: 1. A tougher look at requests for rapid tax amortization to see that proposed facilities meet dispersal criteria. 2. "Far-beyond-the-suburbs" locations for new military facilities. 3. Planning by the military to do more buying from "dispersed" plants.

Absentees—There is nothing in the new program to require the dispersal of existing facilities. Also absent is the requirement of the old plan that an installation should be 10 miles beyond the rim of a target area.

Says Defense Mobilizer Arthur S. Flemming: "No single distance standard and no single set of protective construction specifications against nuclear, chemical and unconventional weapons are feasible."

Criteria—Still, distance from a probable target area is regarded as the controlling factor in reducing the risk of damage. In determining an appropriate distance for any given facility, these guides will be used:

1. The most likely targets, such as military, industrial, population and governmental concentrations.

2. The size of those targets.

3. The destructive power of a large yield weapon or weapons suitable to the particular target.

4. The pressures and thermal radiation likely at various distances from an assumed point of detonation.

5. The characteristics of the proposed facility, including underground and built-in protective construction features as they affect its resistance to nuclear, chemical and unconventional weapons.

6. The degree of damage which a facility could sustain and still remain operable.

7. Ground environment or natural barriers which might give added protection to the facility.

8. The economic, operational and administrative aspects of meeting dispersal requirements.

Point No. 8 shows at least a token recognition of the economic facts of life. How much it will be practiced remains to be seen, but, chances are, it won't be completely overlooked.

The Civil Defense Administration has charge of co-ordinating the policy.

Mobilization Priorities

Defense priorities for steel, copper and aluminum will be limited to the Defense department, Atomic Energy Commission and directly related activities. Defense-related programs will get priorities only with specific approval of Office of Defense Mobilization.

Defense Mobilizer Flemming says a new order to that effect does not change basic policy.

That can be taken to mean that the St. Lawrence Seaway, freight car builders, shipyards and others hard pressed for metals can look for little help from defense priorities. It is feared that if ratings are given to one such defense-related activity, others would call for the same help, leaving no one much better off than now. Some government officials openly admit federal action would quite likely worsen the situation.

Confusion

An overhaul of patent and trademark laws is recommended by a Senate Judiciary subcommittee. Present regulations handicap the inventor, they say. Also, there is too wide a gap between the findings of the courts and the Patent Offices. Since 1947, U. S. Courts of Appeals have found 60 per cent of the patents brought before them to be invalid, though the Patent Office said they were O. K.

Here and There

Look for still more tub-thumping by Congressmen about the plight of small businesses. It's likely to open new areas of defense contracting to them, give them more consideration by defense buyers. . . Congress isn't finished with the auto industry. The Senate Commerce Committee is holding hearings on auto marketing practices. . . Legislative proposals to limit use of negotiated contracts by the military are likely. Chairman Carl Vinson (Dem., Ga.) of the House Armed Services Committee says there's far from enough buying by competitive bidding. He's considering a requirement that at least 50 per cent of military buying in each quarter be done that way.

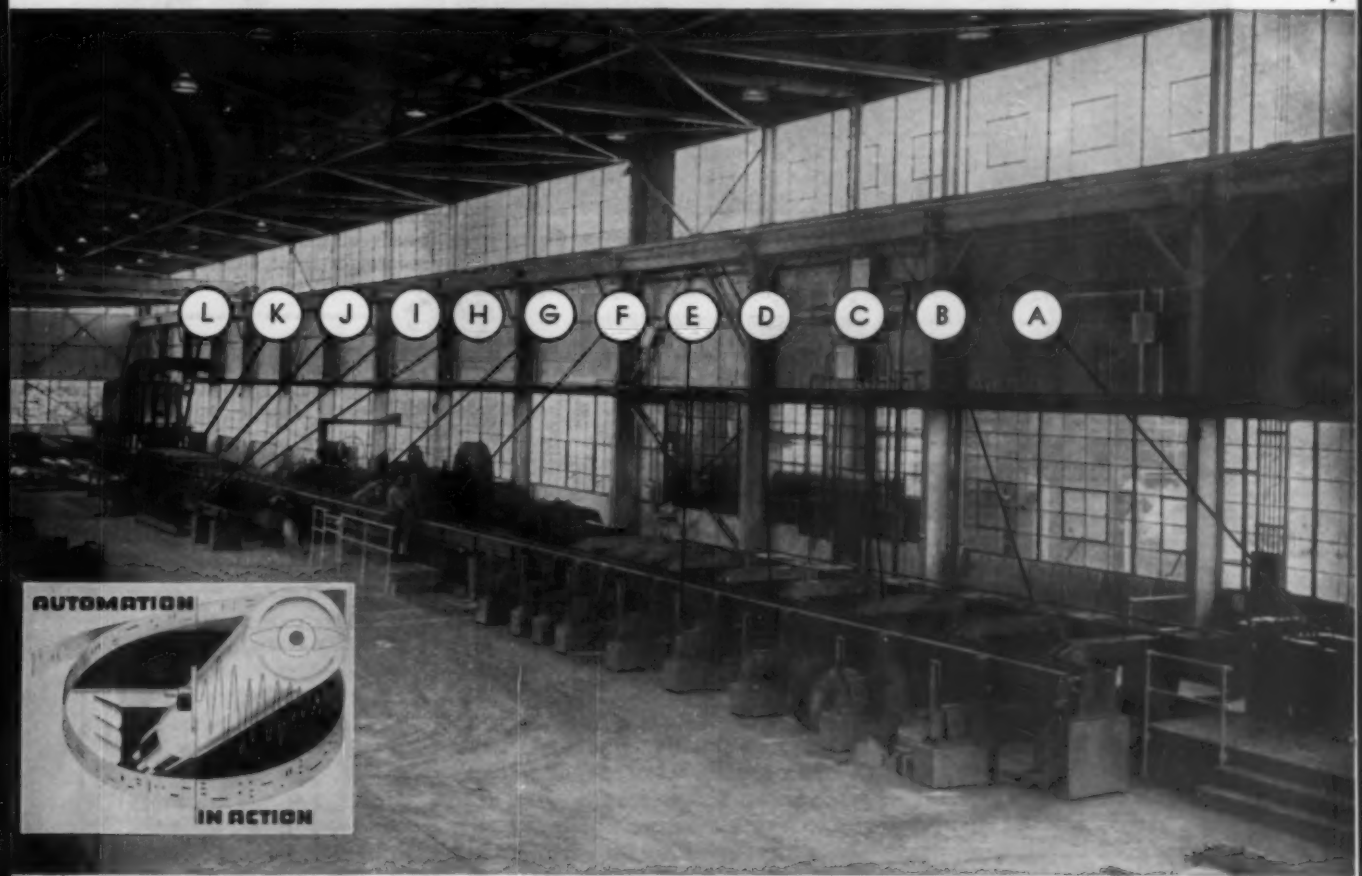
Here's the Fastest, Most Efficient Cold Draw Processing Line Available

The McKay Automated Line that automatically handles and processes hot rolled bars through cold drawing, shearing and straightening in a continuous cycle has proved itself to be far and away the fastest, most efficient cold draw processing operation in action today. Users are finding they can effect great labor savings while actually boosting production, and at the same time get a more uniform product.

Hot rolled, pickled bars are push pointed, drawn, sheared to length, and straightened in a single, continuous operation with no intermediate handling of any type. Hold down and crop gauging on a multiple shear, plus automatic length gauging, permits the shearing operation to keep pace with the maximum drawing cycle. Sheared bars are automatically entered into the straightener which operates at speeds high enough to enable a continuous straight-line flow of bars.

Does the line pay off? Three of four companies now using these lines say they have already paid for themselves and are contemplating the purchase of additional units.

CAN YOU AFFORD TO OPERATE WITHOUT SUCH COST SAVING EQUIPMENT? Remember handling adds nothing to the value of your product. Why not look over the McKay line of automated processing-handling equipment? Why not talk it over with a McKay engineer? There's no obligation.



A—Hydraulic Push Pointer Eliminates pointing prior to drawing. Minimizes point scrap.

B—Multiple Bar Draw Bench One, two or three bars at a time.

C—Horizontal Pneumatic Transfer Arms Takes drawn bars from bench and deposits them on driven shear entry table.

D—Shear Entry Table Conveys drawn bars to the shear.

E—Auxiliary Racks

F—Multiple Bar Shear Has capacity to shear same number and sizes of bars that are drawn.

G—Cut-to-Length Gauge Table Automatic cut-to-length and crop gauges.

H—Shear Run-out Table Driven table conveys sheared bars to straightener entry table.

I—Transfer Skids Entry to straightener table.

J—Automatic Straightener Entry Table Completely automatic feed from transfer skids into straightener.

K—Straightener

L—Straightener Exit Table and Racks

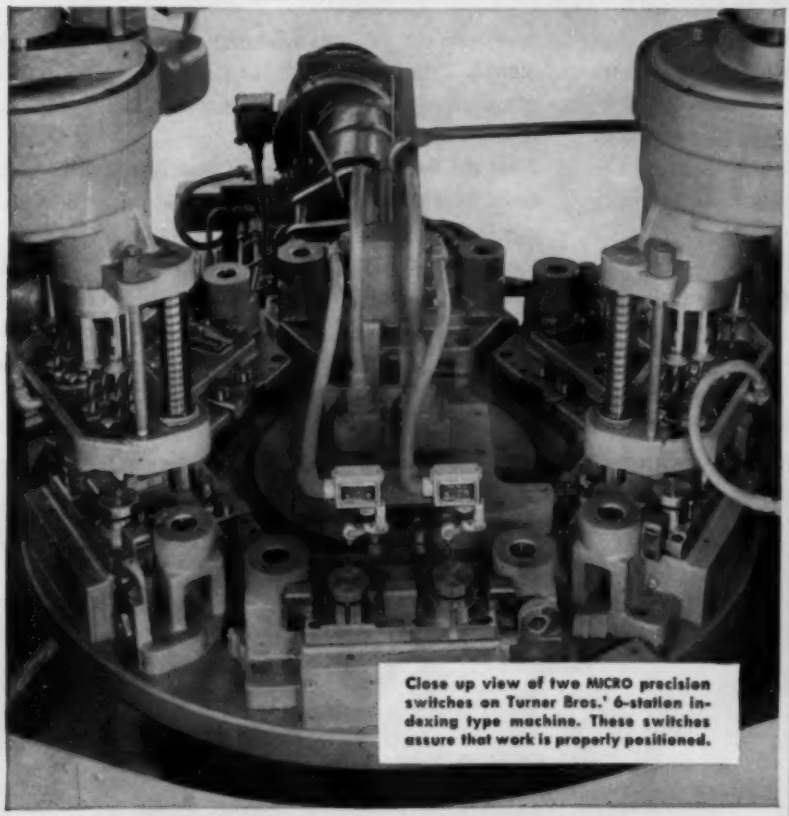
The McKAY MACHINE Company
YOUNGSTOWN, OHIO

McK

ENGINEERS AND DESIGNERS OF EQUIPMENT FOR THE AUTOMOTIVE, FABRICATING AND STEEL INDUSTRIES

MICRO precision switches

...THEIR USE IS A PRINCIPLE OF GOOD DESIGN



Close up view of two MICRO precision switches on Turner Bros.' 6-station indexing type machine. These switches assure that work is properly positioned.

2 Switches assure perfect positioning of parts at rate of 440 per hour

Two MICRO precision limit switches assure perfect positioning of parts on the 6-station indexing type machine made by Turner Bros., Inc.

This perfect positioning, plus the fact that the switches will stop the machine if parts are not properly clamped in place, permits the machine to drill, ream, mill and countersink parts at 440 per hour with utmost precision.

The two switches are located on the dead-center indexing table. Turner engineers selected the MICRO SWITCH units for this application because of:

- Extreme reliability
- Sensitive operation
- Rugged housings and seals to resist entrance of dust and grit.

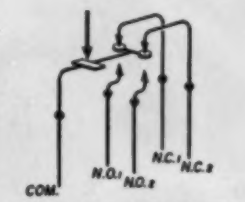
MICRO SWITCH offers the manufacturer or the designer of high speed metal working equipment switches of unusually precise performance —built to give millions of trouble-free operations.

If your product requires the best in switch components it will pay you to know all about MICRO SWITCH. Branch offices, fully staffed with experienced switch engineers are located in key cities to serve you. A call may save you time and money.

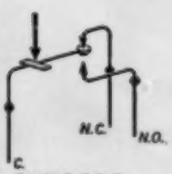
Enclosed Switch with Roller Arm Actuator

An elastomer boot prevents moisture from entering the switching unit through the actuating mechanism. The roller arm actuator is adjustable vertically through 225 degrees. It is adjustable horizontally through 360 degrees. This switch is one of a large "family" of enclosed MICRO precision switches which meet the needs of many industrial requirements for limit, safety and control switches.

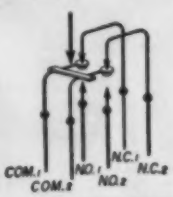
Choice of Contact Arrangements



SINGLE-POLE DOUBLE-THROW SPLIT-CONTACT



SINGLE-POLE DOUBLE-THROW



DOUBLE-POLE DOUBLE-THROW

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Management at Work

J. S. Davey Talks Nuts and Bolts

"ABOUT 90 PER CENT of fastener abuses are caused by a basic misunderstanding of the function of the nut and bolt," says John S. Davey.

He Should Know—As vice president of Russell, Burdsall & Ward Bolt & Nut Co., he helps guide the destiny of some 250,000 types and sizes of fasteners. He specializes in sales and application engineering.

One reason for fastener abuses, explains Mr. Davey, is that engineering colleges do not have courses in fastener technology. "Colleges," he emphasizes, "would see the need for this if they were handling the multitude of questions dealing with user problems."

Crusade—For the last five years, Mr. Davey has conducted a campaign to sell the high strength bolt to industry. His engineering knowledge and sales sense have helped RB&W become the largest independent supplier.

A sizable stumbling block to this relatively new method of fastening have been building codes. But John Davey points out that New York's Mayor Robert F. Wagner signed an amendment to the administrative code on Dec. 8, approving the use of the high strength bolt for joining structural members. The Big City was the last major metropolis (except Boston) to officially sanction the new technique.

More To Do—While the signing of the amendment is a step in the right direction, there is still a long way to go, reports Mr. Davey. The job at hand remains the same as it was five years ago: Convince construction men, architects and bridge builders that it is cheaper to use high strength bolting even though the basic commodity—the bolt—costs about five times more than a rivet.

Future—"A tremendous field lies ahead in studying the economics of stronger and smaller joints, smaller holes and fewer bolts. It will require an entirely new approach to joint design," predicts John Davey.

While his first love for the last five years has been the high strength bolt, MIT-educated Davey spends more than 50 per cent of his time on the road solving various kinds of fastener problems. He provides technical counsel to RB&W's sales engineers as well as assisting customers in fastener applications, product design and assembly techniques. He also serves on more than a dozen committees in various technical societies.

And if you could catch him on his favorite golf course, you might be able to get him to admit that he does not make a distinction between application engineering and selling. "Where does engineering stop and selling begin?" he asks.

Demand continues at high levels as . . .

Used Tool Men Clean Up

DEALERS in used machine tools are looking forward to a pretty good year.

"Our sales trends almost parallel those of the builders of new machines," says Randolph K. Vinson, executive director of the Machinery Dealers National Association, Washington. "Their upturn may be a little faster than ours, but our downturn is slower and not so deep." (See STEEL, Jan. 16, page 37, for a review of new machine tool prospects).

Picture—The upturn in used machine tools came last July, after a so-so first half. Dollar sales in 1955 wound up about 10 per cent ahead of where they were at the end of the previous year. The second half was 25 to 30 per cent better than the corresponding period in '54 (precise dollar figures are not obtainable because many purchases are not reported).

Dealers think they can hold on to their gains as long as enough late-model tools (those built within the last ten years) are available.

Pinch—Supply and demand are running a close race on the late-model market. With the accent on plus production, more shops buying new tools are keeping their old equipment on the line. And when good used tools are available, dealers often find themselves competing with private buyers at plant sales.

But relief is in sight. Drastic model changes for '57 cars are expected to put more used machines on the market than in several years. The aircraft and defense industries are expected to make substantial contributions, too.

More Help—The disposal of government-owned surplus machines is no longer the problem it was to the used dealer. Disposal has become more orderly (as of January, 1955, the government owned about 400,000 tools, not counting those on ships and overseas base shops). Working in co-operation with industry, the government has stretched out the disposal period for these tools.

"Now we hope that the government will extend the use of accelerated depreciation schedules to the purchasers of used machine tools," says Mr. Randolph. The association has been seeking this concession for over two years.

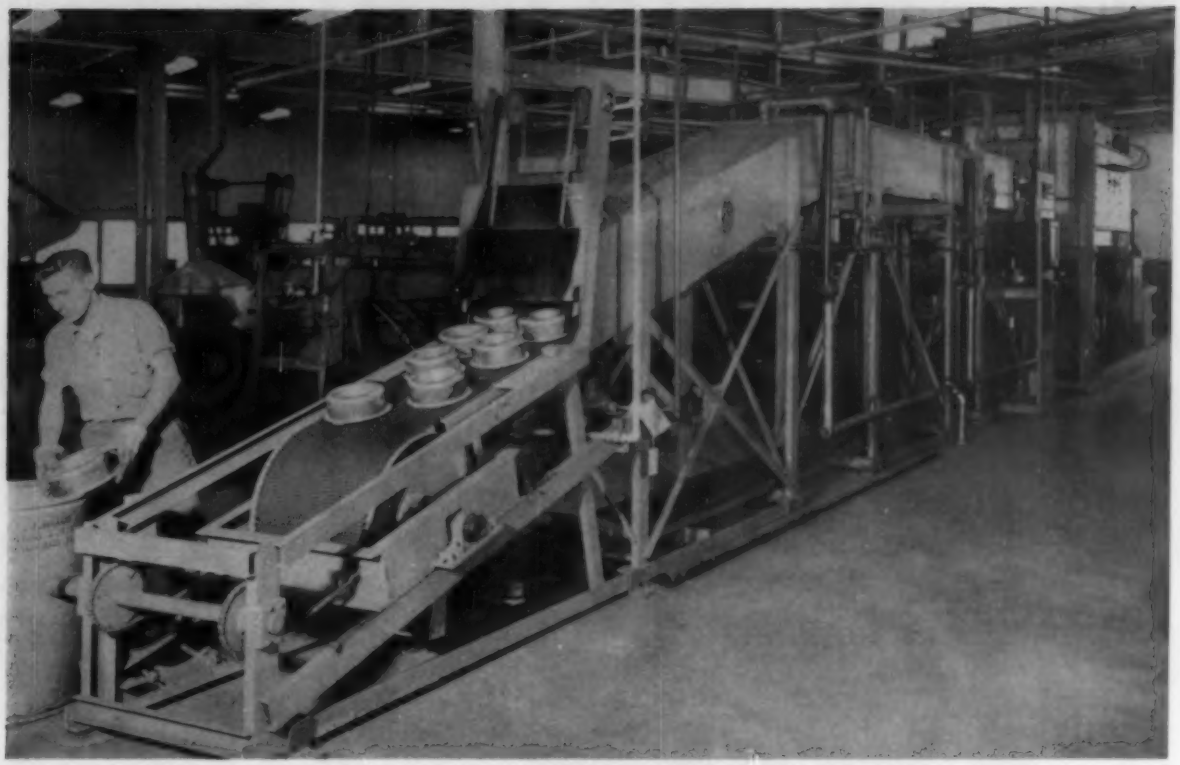
Even without that concession, the 1500 dealers and brokers of used machine tools in the nation expect the spurt in demand that started last July to carry well into 1956.

Canada's Mines Hit Record

Canada's mining industry brought some $1.7 billion of new wealth out of the ground last year. Most spectacular developments were in iron ore, uranium and oil. Canada's iron ore production was about 15 million tons. Exports were up to $90 million (they were $35 million in 1954).

Ore development programs, in addition to northern Quebec and Labrador projects, will get a boost from International Nickel Co.'s new $19-million plant for recovering iron from nickel-copper ores. It's slated for operation this year. Pickands, Mather & Co., Cleveland, is working with the Steel Co. of Canada to reopen an old mine at Bristol, Que.

Canada's uranium production was estimated at $48 million, compared with $6 million in 1945.



Operator unloads stainless steel parts from mesh-belt heat treating furnace at Salkover Metal Processing of Illinois Inc.

Shortages Cloud Furnace Sales Outlook

ASK an industrial heating equipment manufacturer about his sales outlook and he's likely to hedge.

You can't blame him. He's happy about new orders. In 1955, they came in for a peacetime high of $85 million. That's above every year except 1951, when Korea was being felt on the books. But he's almost equally unhappy about shortages. Problems with nickel, structural steel and steel plate, electrical components and manpower are threatening his delivery schedules—in some cases, even his development work.

Perspective — Balancing these divergent attitudes, the industry comes up with an estimate that orders will be off 12 per cent this year from 1955's. That's still a "good year." Current order backlogs are estimated at some $60 million, double levels of a year ago. They assure the industry of a full six months of work at the record levels it achieved in 1952.

"Don't forget the volume in replacement parts," adds the Industrial Heating Equipment Association Inc., Washington. "Averaged out year to year, they run about 12 per cent of the industry's dollar sales."

Sales Spurs — Metalworking's movement towards automation is having its effects on heating equipment sales. Gaining in popularity are the conveyor-type furnaces (see photo), which fit well into most production lines, and specialized types of equipment like induction heaters.

Another booster behind the confident sales outlook is steady technical development. Controlled atmosphere furnaces are being improved by the addition of automatic controls. Heating elements on the market will stand up to high-carbon atmospheres; carbon control has been tied in with automatic dew point. New continuous strip annealing and galvanizing furnaces are opening up markets.

Customers—The auto industry is regarded as the biggest customer. Other important buyers include steel, aluminum, forging and pressed metal industries.

What's popular? Carbonitriding all-purpose furnaces, batch-type, fast-heating furnaces, heavy steel mill equipment and furnaces with carbon potential control are some of the top sellers. Since makers specialize, it's impossible to single out any one leader. Most business is commercial. Defense takes no more than 5 per cent of sales.

Outlook — Long-term prospects look good. A conservative estimate puts the amount of obsolescent heating equipment in use at 35 per cent. The accent on cost reduction makes it a ripe sales target. This year, the industry should sell all the equipment it can produce.

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Yes, Bullard Cut Master, Model 75 with Man-Au-Trol Conversion Unit is the best . . . most versatile automatic Vertical Turret Lathe offered to industry today . . . . .

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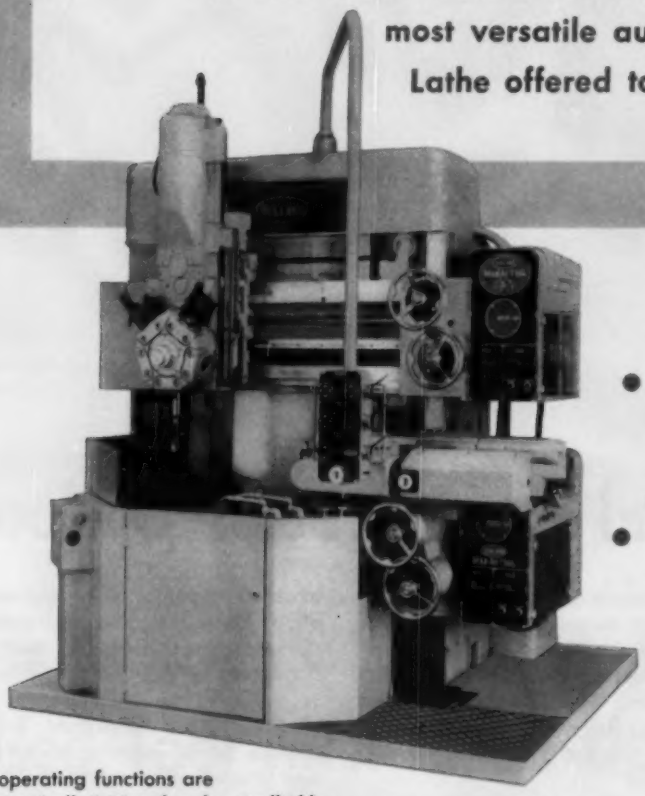

All operating functions are automatically initiated and controlled by one function control drum and two detector drums in Man-Au-Trol: Table Speeds (20 Available), Feeds (16 Available), Head Travel in feed or traverse, right or left, up or down or 45° in any quadrant and Turret Indexing.

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The Man-Au-Trol Conversion Unit can be applied to any or all heads of Cut Master, Model 75 right in your plant.

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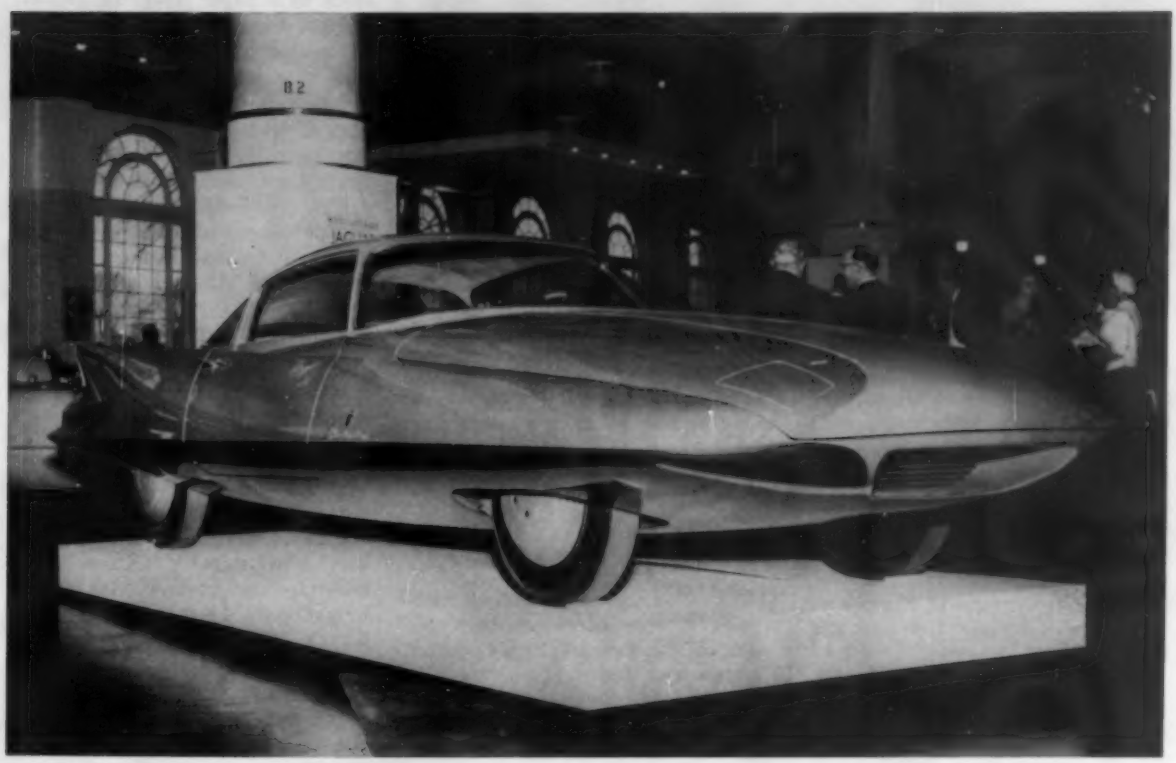

Ghia Gilda, experimental European car, hints where . . .

Automakers Look Ahead

AUTOMOTIVE professors came down from their ivory towers to talk about cars of the future at the Society of Automotive Engineers' annual meeting in Detroit.

Title—"The Next Decade and the Automobile." The cast—University of Michigan engineering professors, E. T. Vincent, F. L. Schwartz, Charles Lipson, A. K. Lahti and Charles Harris. Also: U. O. Lahti, who is director of research, Consultants to Management Inc., Ann Arbor, Mich.

Discussing body and chassis design in relationship to turbine engines in the next decade, the professors indicated that the gasoline, reciprocating engine still would be pushing cars around in 1965. Most automakers agree, although they still are spending plenty of time and money on turbine engine development.

The feeling is that as long as the piston engine remains, body and chassis designs will change relatively little, except for dictates of style.

Power Plant — Prof. Vincent made a good case for the reciprocating engine. He visualizes horsepower requirements in 1965 as being 200 hp in the low-priced field, 250 in the medium and 320 for luxury models. That rating, incidentally, already has been attained in the DeSoto Adventurer.

To reach these horsepower heights and the high compression ratios that make them possible, Prof. Vincent points out that cheaper, higher octane fuels must be developed. Supercharging and fuel injection are two other possibilities for piston engine development.

Prof. Vincent says: "Supercharging is the best means of obtaining maximum power from a spark ignition engine. It does not, however, offer much in the way of improved fuel consumption, even with an exhaust driven turbocharger." Fuel injection, he adds, can be responsible for smoother operation, lower octane requirements and some gains in power and economy.

Other Side—Automakers generally agree with Prof. Vincent. They say that there are plenty of improvements to be made on piston engines before moving on to expensive turbine models. And they have some answers of their own.

One manufacturer points out that as automotive stylists continue the campaign for sleeker silhouettes and lower centers of gravity, there are two areas still to be explored in making reciprocating engines smaller.

Removing carburetor and air cleaner assemblies from the top of engines would make them lower. Fuel injection systems would help here, as would a disposable air filter to replace bulky air cleaners. An even bigger achievement, say

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DeSoto's "Adventurer" follows the trend toward luxury sports cars

designers, would be getting rid of the oil pan. One possible answer here is dry sump lubrication.

Dry Sump — Already tested on European racing cars, this system looks like a good bet in the next three or four years. The pan is removed and a cover placed on the bottom of the engine. Oil is kept in a tank reservoir and pumped to the engine. Result—4 or 5-in. are taken off engine height.

The conclusion is that the reciprocating engine, in a smaller, lighter, more power-packed model, will be around for a long time to come. As Prof. Vincent puts it: "If an inexpensive, high-octane fuel can be developed, smaller, lighter and higher-speed engines can be built to give more miles per gallon at lower cost."

Turbines—Where does this leave the turbine power plant? Prof. Schwartz delved into the technical aspects of turbine engines and came up with problems relating to operating temperatures, high fuel consumption, noise and exhausts. Behind these problems is the one trouble spot automakers are most sensitive about—cost.

Turbine engines are expensive to build and operate. Although cast iron probably can be used for compressor housings and other parts, such items as turbine blades, discs and chamber liners still will be made from high temperature resistant metals.

Prof. Schwartz concludes: "The gas turbine could compete with the reciprocating engine on a weight, size and economy basis. Advances in design and fabrication may result in its competition on a cost basis."

Probably the immediate future of the turbine power plant depends pretty much on automobile sales in the next five years. If automakers can continue to show good profits on conventional models, chances are the gas turbine will be held in reserve.

Perfect Circle Engine Block

An automobile engine block with replaceable cylinders has been developed by Perfect Circle Corp., Hagerstown, Ind.

Arthur M. Brenneke, chief engineer, claims the design provides wet cylinder liner construction at low cost. Here are the details of how it works:

Centrifugally cast iron cylinders are silver brazed to a steel top block by a paper Neoprene gasket, and the lower ends of the cylinders are sealed by rubber rings where they pass into the crankcase.

The design means that engines with a wide range of bore sizes can be built on one basic block. From a cost standpoint, softer iron can be used in the block itself. This will permit up to 25 per cent more blocks to be machined on a given set of tools. Another possibility—use of aluminum blocks with removable cylinders.

U. S. Auto Output

Passenger Only

	1955	1954
January	659,719	456,765
February	675,769	443,257
March	794,188	526,076
April	754,007	533,470
May	724,891	494,250
June	649,372	504,811
July	659,979	441,451
August	614,392	436,650
September	461,592	285,860
October	517,669	236,635
November	748,559	508,466
December	682,698†	641,971
Total	7,942,983†	5,518,662

Week Ended	1955	1954
Dec. 17	169,256	151,924
Dec. 24	150,881	124,854
Dec. 31	105,670	124,250
	1956	1955
Jan. 7	125,245	150,585
Jan. 14	151,655†	155,109
Jan. 21	150,000*	161,150

†Preliminary. *Estimated by STEEL
Source: *Ward's Automotive Reports*

Mercury's XM-Turnpike Cruiser

Ford Motor Co. unveiled Mercury's XM-Turnpike Cruiser at the Chicago Motor Show.

Designed to take advantage of a spreading system of express highways, the Cruiser is built wide and close to the ground. Its specs: height, only 4.4-ft, width, 77.1-in., length, 18.4-ft.

Like the Packard Predictor's roller roof doors, the Mercury dream car sports transparent plastic "butterfly" shutters in a steel top. These automatically raise when the doors are opened.

The Turnpike Cruiser is part of the automaker's plan to get the buying public in a frame of mind to accept two cars, one for town travel and a second for long distance transportation.

Exhaust Notes

General Motors says that its 225-hp Corvette engine will be offered in any 1956-model Chevrolet. This division also announces an inbuilt retarding device for automatic, heavy-duty truck transmissions . . . Cadillac offers a six-way power seat adjuster on this year's models . . . Recent trend among auto buyers is to shy away from the flashy two and three-tone color combinations and revert to solid colors. This may mean a more conservative use of metal trim, but only in style. The amount of trim is expected to increase . . . L. L. Colbert, Chrysler Corp. president, reports 632,000 sq ft of floor space will be added to Chrysler's Newark, Del., Tank Plant when its defense contract expires this coming May. The Newark plant then will make Plymouth cars.

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The steel warehouse has long been an integral part of America's industrial distribution system. Through planned buying, the warehouse is in a position to supply "less than mill runs" and to fill orders for quick delivery on all types of steel.

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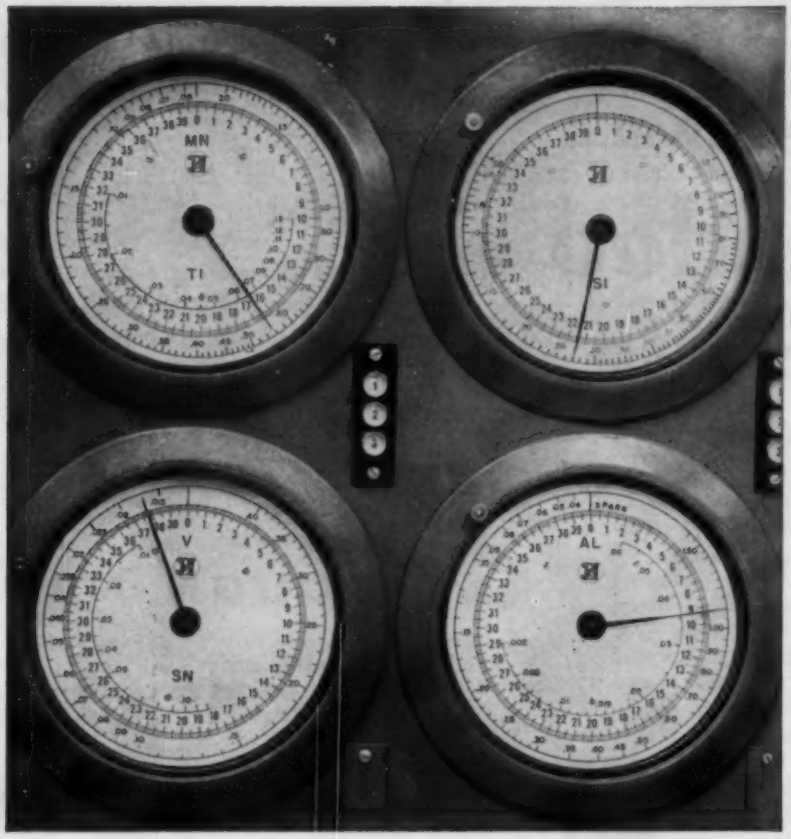


We see what's in TIMKEN® steel while we make it, to give you greater uniformity in your forgings

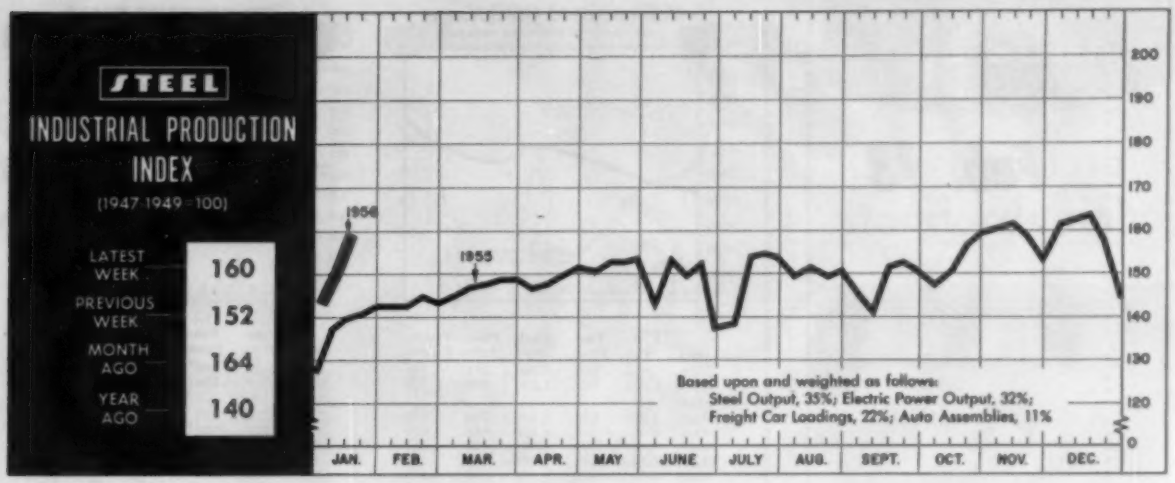
YOU see above four of the twelve spectrometer dials used to analyze steels being melted at the Timken Company. In just 40 seconds this direct-reading spectrometer tells the exact chemical composition of a heat of Timken fine alloy steel. Results are flashed back to the furnace so the melter can keep close control of the analysis. This carefully controlled chemistry produces uniform composition from heat to heat. You can be sure that forgings made from Timken® forging steels will give you uniformly high ductility and resistance to impact.

And because your order of Timken forging steel is handled individually in our mill we are able to target our conditioning procedure on your particular forging requirements. This minimizes your rejects.

Here's an added plus: Timken steel forging bars *save* you steel because their good dimensional tolerances produce uniform weight multiples with a minimum of steel lost in flashings. Get all these results in your forging steels. Specify Timken forging steels. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING



Week ended Jan. 14

Industrial Production Bounces Back

INDUSTRIAL PRODUCTION is almost back to pre-holiday standards, according to STEEL's index. Despite automotive cutbacks most signs point to a continuation of lofty levels for the current trend line.

Based on 1947-1949 = 100, the week ended Jan. 14 checked out to a preliminary 160 on the strength of heavy output by the electric power industry, steelmaking activities and freight car loadings. Automotive production contributed to the comeback from the 152 level of the previous week, but production is still under 1955 figures.

Backbone—Steelmaking still is the strongest feature of industrial activity, hitting a record 2,428,000 tons for the week ended Jan. 15, according to the American Iron & Steel Institute. The previous record of 2,421,000 net tons for ingots and castings was set during the week ended Dec. 18, 1955. AISI estimates that production last week was 2,391,000 tons.

By now it is definitely established that automakers are pulling in their horns after a record-breaking 1955, but don't count on an over-all let down in the economy because of this. Harlow H. Curtice, president of General Motors Corp., reaffirmed his company's faith in expanding markets when he told the 1956 Motorama luncheoners that GM will spend a record $1 billion this year for capital improvements. The previous record was $737 million spent in 1954.

Mr. Curtice said he thinks 1956 will be the second-best sales year in automotive history. "I estimate that the automobile industry will produce and the domestic market will absorb approximately 7.5 million passenger cars and trucks . . . Including Canada and for export to other markets, unit production in 1956 should approximate 8,350,000 cars and trucks."

Crystal Balling—Gross national product this year will be more than $400 billion, Mr. Curtice believes. But he said the gains will

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	2,391[1]	2,428	2,008
Electric Power Distributed (million kw-hr)	11,500[1]	11,057	9,928
Bitum. Coal Output (1000 tons)	9,265	9,100	8,510
Petroleum Production (daily avg—1000 bbl)	7,000[1]	7,026	6,689
Construction Volume (*ENR*—millions)	$461.8	$460.5	$364.7
Auto, Truck Output, U. S., Canada (*Ward's*)	183,571	149,386	184,362
TRADE			
Freight Car Loadings (1000 cars)	720[1]	611	645
Business Failures (Dun & Bradstreet)	245	198	200
Currency in Circulation (millions)[3]	$30,914	$31,152	$30,196
Dept. Store Sales (changes from year ago)[4]	−11%	+11%	+13%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$21,699	$22,822	$19,705
Federal Gross Debt (billions)	$280.3	$280.8	$278.5
Bond Volume, NYSE (millions)	$19.6	$16.9	$25.7
Stocks Sales, NYSE (thousands of shares)	12,101	9,632	17,369
Loans and Investments (billions)[4]	$86.5	$86.7	$85.8
U. S. Govt. Obligations Held (billions)[4]	$30.0	$30.1	$36.6
PRICES			
STEEL's Finished Steel Price Index[5]	209.10	209.10	194.53
STEEL's Nonferrous Metal Price Index[6]	271.0	273.2	216.9
All Commodities[7]	111.7	111.8	110.1
Commodities Other than Farm & Foods[7]	119.9	119.8	115.1

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1956, 2,461,893; 1955, 2,413,276. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-1939=100. [6]1936-1939=100. [7]Bureau of Labor Statistics Index, 1947-1949=100

Coming

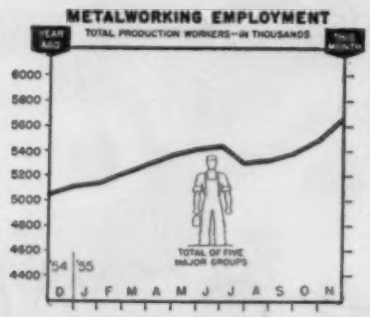
Feb. 13

IN

STEEL

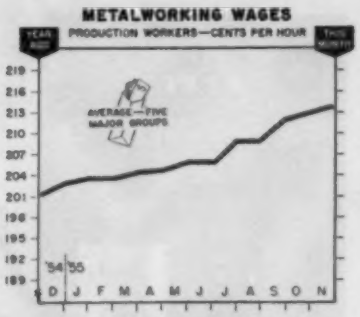
It's Time to Grow

When, where and how to expand? These are the vital questions in planning to match your company's growth with the growth of the economy. Starting too late may mean the loss of your full share of tomorrow's bigger markets. Building too much, too little or too fast can be equally costly. Shifts in markets, in labor supplies and in raw materials sources will be other major problems. STEEL's guide lines for growth will show you how to gage your potential and how best to make the most of it.



1954	Prim. Mtls.	Fab. Prod.	Mach- inery	Elec. Mchy.	Trans. Equip.
Nov.	988	844	1,092	811	1,334
Dec.	1,002	843	1,106	809	1,375
1955					
Jan.	1,013	834	1,109	800	1,400
Feb.	1,032	844	1,125	803	1,426
Mar.	1,057	860	1,144	803	1,447
Apr.	1,076	868	1,164	804	1,462
May	1,096	877	1,174	809	1,456
June	1,115	884	1,182	816	1,447
July	1,098	863	1,160	802	1,420
Aug.	1,112	877	1,155	818	1,379
Sept.	1,134	894	1,149	855	1,357
Oct.*	1,138	903	1,196	884	1,370
Nov.*	1,146	915	1,221	876	1,507

*Preliminary
U. S. Bureau of Labor Statistics



1954	Prim. Mtls.	Fab. Prod.	Mach- inery	Elec. Mchy.	Trans. Equip.
Nov.	214	193	203	184	218
Dec.	214	194	204	184	219
1955					
Jan.	216	195	203	185	220
Feb.	215	195	204	185	220
Mar.	216	195	205	185	221
Apr.	217	195	206	186	220
May	218	196	207	187	222
June	220	196	208	187	219
July	228	199	208	188	223
Aug.	227	199	209	187	224
Sept.	233	201	211	189	226
Oct.	231	202	213	190	228
Nov.*	232	203	215	190	230

*Preliminary
U. S. Bureau of Labor Statistics

Charts copyrighted, 1956, STEEL

be lower than in 1955, which he characterized as the most outstanding year in the history of the country from a business and economic standpoint. Three main reasons for Mr. Curtice's optimism: 1. Predicted capital expenditures of $32 billion. 2. Continuation of the upward trend in construction despite his figures indicating a slightly lower home-building level. 3. Slightly higher spending by Defense department and other federal, state and local agencies.

Based on the prospect of full employment in 1956, Mr. Curtice said: "Personal income will rise and disposable income will reach a new level. This may be raised still further through lower taxes."

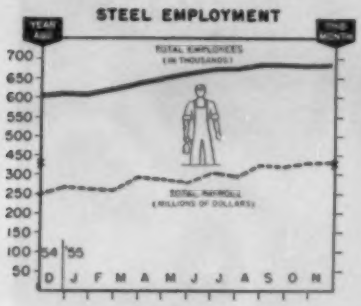
Automakers Continue Cutbacks

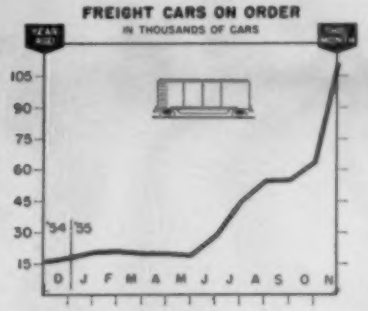
For the present, however, automakers are cutting back on employment and production to allow dealers to unload some of their record stock. Chrysler Corp. led the way with layoffs in the Chrysler, Dodge and Plymouth divisions. In many cases, the layoffs came for probationary employees of less than 90-day's seniority—workers who were put on to push production to record levels in late 1955. Chrysler division cut production by 10 per cent. Production schedules at Ford and Mercury Divisions of Ford Motor Co. are lower this month, but Lincoln Division has stepped up production. General Motors Corp. laid off about 3950 workers in six Buick - Oldsmobile - Pontiac assembly plants last week. However, the independents were scheduling full production after a slow start in the first week of the month.

Building Heads for New Record

All signs point to another whopping year in construction. Activity in December showed no signs of slowing up, according to F. W. Dodge Corp. Total awards in 37 eastern states set a record for any December at $1,920,754,000. Both nonresidential and heavy engineering classifications figured in the new mark. The year's total of $23.7 billion also set a record, the tenth in a row, Dodge reports.

Engineering-News Record reports that contracts for the week ended Jan. 12 totaled $461.8 million, almost $100 million above the comparable week last year. This still left 1956 about 20 per cent behind 1955 because of the slow first week in January. *ENR* says





	Employment in Thousands		Payroll in Millions	
	1955	1954	1955	1954
Jan.	605	645	$258.8	$251.3
Feb.	616	636	255.1	236.6
Mar.	630	621	288.2	249.7
Apr.	643	609	282.0	232.6
May	654	606	249.1	234.4
June	667	606	298.4	236.4
July	676	608	296.8	232.8
Aug.	680	601	320.7	238.8
Sept.	680	597	317.1	234.6
Oct.	678	596	325.1	244.7
Nov.	680	599	326.1	247.7
Dec.	...	605	....	262.2

American Iron & Steel Institute

	Awards		Backlogs (end of month)	
	1955	1954	1955	1954
Jan. ..	5,087	2,942	18,395	27,959
Feb. ..	2,690	2,057	18,633	25,441
Mar. ..	2,156	348	17,974	20,966
Apr. ..	2,706	909	17,930	17,817
May ..	3,041	1,071	16,886	15,615
June ..	13,365	1,139	27,102	13,860
July ..	18,007	883	42,888	12,889
Aug. ..	13,405	2,425	52,803	13,013
Sept. .	3,228	2,396	52,913	11,993
Oct. ..	12,843	2,704	61,954	12,853
Nov. ..	51,066	3,754	109,370	14,805
Dec. ..	.....	2,685	.....	15,317
Total .	.....	23,313		

American Railway Car Institute

that commercial building, which began to fizzle in fourth quarter last year, is rising again and seems set for a new boom in 1956.

While it has been the consensus for some time that heavy construction would be the mainstay of the building industry in 1955, one strong voice belonging to Albert Cole, federal housing administrator, predicted that 1.3 million new homes will be built in 1956. That would be about equal with last year, the second best in the history of the country. The National Association of Home Builders foresees a decline of 50,000 to 100,000 units this year.

Mr. Cole also anticipates the industry will account for $9 billion this year in improving 10 million or more existing homes. Another 10 million homes will get maintenance and repair work.

GE Takes Ten-Year Look

The "More Power to America" council at General Electric Co., Schenectady, N. Y., predicts that by 1965 each U. S. worker will use as much electricity every working hour as it takes to light 1000 one-family homes for the same period. Chairman R. B. Reid says the council has also set up the following electricity industry goals for 10 years hence: A 33-per-cent increase in worker output; a 50-per-cent increase in the annual rate of expenditures for plant and equipment, or $45 million in 1965; a 110-per-cent increase in community electrification; and a 117-per-cent increase in farm electrification.

GNP May Reach $406 Billion

National Securities & Research Corp., New York, is predicting a gross national product of $406 billion for 1956. In its ninth consecutive annual forecast, the corporation says that personal consumption will rise $9 billion; new construction will go up $1.6 billion; producers' durable equipment up $3.5 billion; change in business inventories up from $3 billion last year to $3.3 billion this year; federal government purchases of goods and services up $1 billion; and state and local spending up $2.5 billion. The Federal Reserve Board Index of industrial production will average 143 in 1956 compared with an estimated 139 average for 1955, the forecast says.

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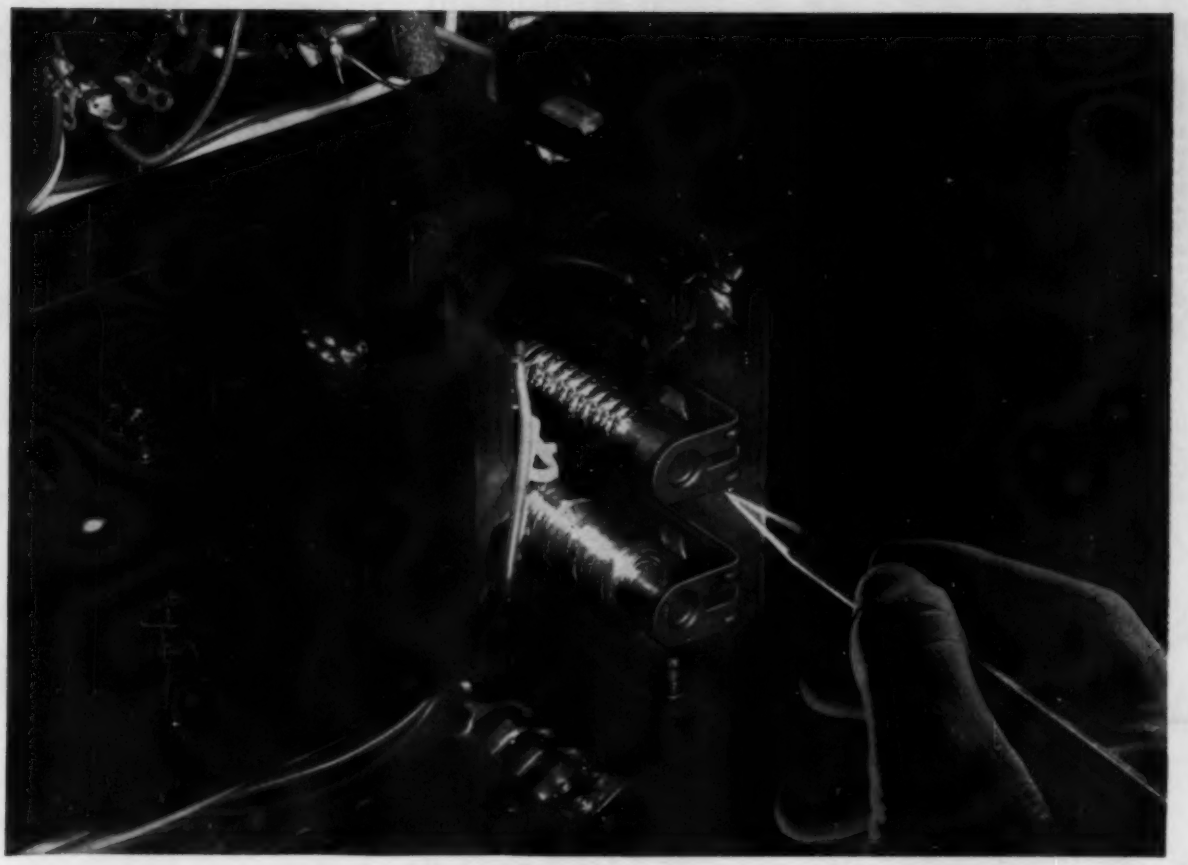

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This one-piece, spring steel SPEED CLIP is assembled quickly and easily to the television tuning coil. The SPEED CLIP, with tuning coil attached, is then simply snapped by hand into twin mounting holes in the chassis to lock the unit securely in place. This SPEED CLIP cuts costs on the assembly line. And it permits fast and simple adjustment of the television tuning coils, eliminating the problem of blindly searching with a screw driver for the slot of a special hex nut.

Find out how SPEED NUT Brand Fasteners can help you improve your own fastening methods. Ask your Tinnerman representative for details of our Fastening Analysis Service or write for Bulletin No. 336.

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FASTEST THING IN FASTENINGS®

F. H. MULLIGAN
. . . president of Charles Hardy Inc.

F. H. Mulligan was elected president, **Charles Hardy Inc.**, New York. He succeeds **John D. Dale**, now chairman of the board. Mr. Mulligan was vice president.

Russell L. Lepley was elected vice president-general manager, **Connellsville Mfg. & Mine Supply Co.**, Connellsville, Pa. **Paul A. Doorley** was made vice president and secretary-treasurer.

Asa H. Myles was appointed chief engineer and member of the operating committee of **Electric Controller & Mfg. Co.**, Cleveland, now a division of Square D Co.

Clifford N. Cox was made sales manager, **Insul-Mastic Corp. of America**, Pittsburgh.

Willis G. Scholl, a group vice president, was elected executive vice president, **Allis-Chalmers Mfg. Co.**, Milwaukee. **Boyd S. Oberlink** was named vice president in charge of the tractor group, succeeding Mr. Scholl.

Clifford Faust was elected vice president, **National Wire Products Corp.**, Baltimore.

Austin Goodyear, vice president and general manager of the industrial rubber, machinery and engineering divisions of **Hewitt-Robins Inc.**, Stamford, Conn., was promoted to executive vice president.

H. K. INTEMANN
. . . Electro Metallurgical executive v. p.

H. K. Intemann was appointed executive vice president, **Electro Metallurgical Co.**, a division of Union Carbide & Carbon Corp., New York. He was vice president-general sales manager.

Matthew J. Fleming Jr. was elected president, **Harris Products Co.**, Cleveland, subsidiary of Clevite Corp. Formerly assistant to the Clevite president, he succeeds **Newton D. Baker III**, resigned.

Thomas J. Moore Jr. was made director of purchases for **La Salle Steel Co.**, Chicago. He will also direct material and production planning. He was general manager, Brainard Steel Division, Sharon Steel Corp.

A. C. Whitaker Jr. was appointed assistant director of iron ore procurement, **Wheeling Steel Corp.**, Wheeling, W. Va. **William P. Weigand** was made chief production engineer at the Benwood, W. Va., works.

Leslie F. Robison was elected vice president-sales, **Little Giant Products Inc.**, Peoria, Ill. **Charles E. Williams** was named vice president-engineering and also heads the new gear division.

Herbert H. Schmiel was elected chief engineer, industrial hydraulics division, **Parker Appliance Co.**, Cleveland.

PAUL C. ACKERMAN
. . . director of engineering at Chrysler

Paul C. Ackerman, executive engineer of **Chrysler Corp.**, Detroit, fills the new position of director of engineering.

Don L. Douglass was made parts sales manager for **Thew Shovel Co.**, Lorain, O. He was a vice president of American Steel Dredge Co.

C. G. Gehringer was made manager, scale division, **Fairbanks, Morse & Co.**, Chicago. He succeeds **George C. Worthley**, retired.

John Gabrenas was made chief engineer of **Firth-Loach Metals Inc.**, McKeesport, Pa. He was with Firth-Sterling Steel Co.

Robert R. Coombs was elected vice president and **Floyd D. Hunter** secretary-treasurer, **Valley Mould & Iron Corp.**, Hubbard, O.

Albert G. Noble, Adm., USN, ret., was elected executive vice president, **Vitro Corp. of America**, New York. He succeeds **George White**, resigned.

Charles A. Peterson was made chief industrial engineer of **Graton & Knight Co.**, Worcester, Mass.

Edward S. Maury was appointed general sales manager, **Marion Electrical Instrument Co.**, Manchester, N. H.

Richard S. Taylor succeeds **Philip**

M. E. SWAIM
. . . *National Supply Co. gen. sales mgr.*

T. W. FAUNTLEROY
. . . *Pittsburgh-Des Moines gen. sales mgr.*

A. STEWART MURRAY
. . . *Tyson Bearing Corp. president*

B. Burtis, retired, as Philadelphia district sales manager, **Bethlehem Steel Co.**

M. E. Swaim was made general sales manager, **National Supply Co.**, Pittsburgh, a new position. He is succeeded by **Thomas B. Herndon** as manager of oil field sales. Mr. Herndon was sales manager, production equipment.

Joseph P. Murphy was promoted from chief estimator to plant manager, **Luria Engineering Co.**, Bethlehem, Pa.

Universal-Cyclops Steel Corp. appointed **Frank E. Garratt** works manager at its Bridgeville, Pa., plant and **Gilbert Soler** as its technical director.

William L. Baker was made sales engineer of **Whitman & Barnes,** Plymouth, Mich., division of United Drill & Tool Corp.

Donald L. Shirley was made Pacific Northwest sales manager for **Link-Belt Co.** He continues headquarters in Seattle.

Homer T. Pittman was appointed director of manufacturing for **F. C. Russell Co.**, Cleveland.

Wilfred T. Hanlon was named manager of **Chrysler Corp.'s** new stamping plant to be erected at Twinsburg, O. **Vance Wray** succeeds Mr. Hanlon as manager of the Youngstown steel stamping plant.

T. W. Fauntleroy succeeds **John E. O'Leary,** retired, as general sales manager of **Pittsburgh-Des Moines Steel Co.**, Pittsburgh.

Kenneth H. Gayle Jr., former president of Ingalls Iron Works Co., was elected president of **Delta Tank Mfg. Co.,** Baton Rouge, La. He succeeds **H. S. Phillips,** now chairman of the board.

Thomas Pakenham was made general manager, **Portland Machine Tool Works Inc.**, South Portland, Me. He is in charge of the machine tool and heavy machining divisions; also the recently expanded aircraft division.

THOMAS PAKENHAM
. . . *Portland Machine Tool Wks. gen. mgr.*

A. Stewart Murray was elected president and **Edwin R. Broden** chairman of **Tyson Bearing Corp.,** Massillon, O. Mr. Murray succeeds **H. I. Lewis,** resigned, but who will serve as a consultant and adviser. Mr. Broden, president of SKF Industries Inc., parent concern, replaces **Richard H. DeMott,** resigned.

Clarence B. Brown Jr. was named southeastern district manager for **Hardinge Co. Inc.,** York, Pa. He replaces **J. K. Towers,** retired.

Walter E. Garrigan was made manager of **Okonite Co.'s** new sales office and warehouse in Syracuse, N. Y.

A. L. Hospers was named southern regional sales manager of **Union Asbestos & Rubber Co.'s** heating and cooling division. He is at Atlanta.

M. J. Taup was named administrative assistant to vice president-sales, **Vickers Inc.,** Detroit. He is succeeded by **A. M. Lane** as manager, mobile products sales.

Fred M. Glassford, works manager, Dodge plant, was made manufacturing manager of the **Dodge Division,** Chrysler Corp., Detroit.

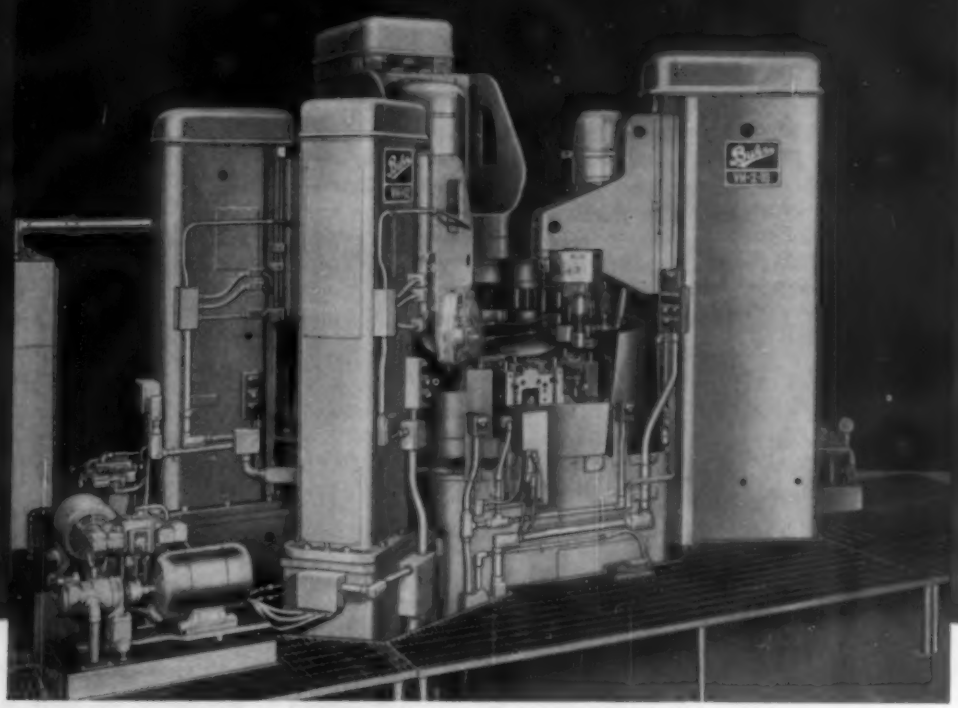
James H. Ammerman was made Pittsburgh district sales manager of **North American Refractories Co.**

Warren A. Scott joined the sales

ANOTHER EXAMPLE of

Buhr ECONOMATION

Drills, chamfers and reams (2) bolt holes, and mills and chamfers bearing notches in 600 connecting rods an hour



This 8-station 4-column Buhr Economatic, featuring two angular mill units, performs operations on connecting rods as follows—

Station 1—load and unload 4 parts . . . Station 2—mill bearing notch in (4) parts . . . Station 3—chamfer bearing notch in (4) parts . . . Station 4—drill (8) $^{23}/_{64}$"-holes 1/2 through . . . Station 5—chamfer (8) holes . . . Station 6—drill (8) $^{23}/_{64}$"-holes through . . . Station 7—rough-ream (8) $^{3}/_{8}$"-holes . . . Station 8—finish-ream (8) .390"-holes.

Features of this Buhr Economatic, other than the two angular mill units, include a 60"-diameter Buhr Powerflo index table, automatic clamping and manually-operated part ejector.

Buhr

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HERBERT E. BARTH
. . . *American Blower executive v. p.*

GEORGE ENDICOTT
. . . *Morgan Construction executive v. p.*

JOHN W. VANCE
. . . *works mgr., Henry Disston Div.*

staff of **Brumley-Donaldson Co.**, Los Angeles.

Herbert E. Barth fills the new position of executive vice president, **American Blower Corp.**, Detroit. He is succeeded as vice president-sales by **Edwin W. Petersen**, former sales manager. At Canadian Sirocco Co. Ltd., subsidiary, **Clarence W. Johnson** was elected president, **Richard R. Noyes** vice president-sales.

Harold Hoekelman was made assistant district manager of **Youngstown Sheet & Tube Co.'s** Chicago district operations.

Robert J. Garmy was made an assistant chief engineer for **Republic Steel Corp.** steel plants in Canton and Massillon, O.

Metal & Thermit Corp., New York, appointed **Charles H. Carpenter Jr.** assistant manager, market development department. **Henry Bryk** was made superintendent, Thermit Metal Department, Carteret, N. J. **Charles M. Dick Jr.** was named to direct the Kel-Ray (projectors) sales force. **C. J. Beasley** was made a vice president and will direct financial activities of the company.

Morgan Construction Co., Worcester, Mass., elected **George Endicott** executive vice president. A vice president and manager, Morgoil bearing department, he is succeeded in the latter post by **Charles S. Mercer. Noman A. Wilson** was made manager, research department; **Richard W. Young**, assistant chief engineer; **E. Raymond Comtois**, chief draftsman; and **Andrew C. Marsters**, proposal engineer.

David B. Voorhees was elected president, **R. C. Neal Co. Inc.**, Buffalo. He succeeds **Ray C. Neal**, retired. Mr. Voorhees was vice president-sales manager.

Eugene B. Kovats was named mideastern district sales manager, **Gerrard Steel Strapping Division**, U. S. Steel Corp. He has headquarters at McKees Rocks, Pa., and succeeds **Ernest P. Ribet**, retired.

Charles H. Hallett was made manager of the recently purchased Wallingford, Conn., plant of **Joseph T. Ryerson & Son Inc.**

George M. Ebert was elected treasurer and assistant to the president of **Hard Mfg. Co.**, Buffalo.

John W. Vance was named works manager, **Henry Disston Division**, H. K. Porter Company Inc., Philadelphia. He was chief plant engineer. Other appointments: **W. E. Tretch** manufacturing manager-industrial division; **W. N. Ritchie** manufacturing manager-hardware division; **E. M. Schempp** manufacturing manager-steel division; **A. E. Juram** manager-industrial relations division; **J. H. Mulherin** manager-metallurgical and inspection division; **J. G. Brandt** manager-materials control division; and **C. S. Cassels** plant engineer.

Cecil W. Farrar was elected president, **Case Mfg. Corp.**, subsidiary of W. A. Case & Son Mfg. Co., Buffalo.

Raymond H. Whitney was made southeastern district manager, **Morse Chain Co.** He is at Charlotte, N. C.

Richard N. Peters was made division sales manager for **Reynolds Metals Co.** at San Francisco. He is replaced as division manager at Seattle by **John Clearwater.**

M. S. Umbenhauer was made manager of power plant design for **Fluor Corp. Ltd.**, Los Angeles.

OBITUARIES . . .

Ivar B. Dahlstrom, 48, president of **Dahlstrom Machine Works Inc.**, Chicago, died Jan. 9. He founded the firm in 1943.

Richard Ruemelin Sr., founder and president, **Ruemelin Mfg. Co.**, Milwaukee, died Dec. 26.

Ben F. Schottenfels, 77, senior vice president, **David J. Joseph Co.**, Cincinnati, died Jan. 6. He had been with the firm for 57 years.

Harold Thomas, former owner of **Thomas Brass Foundry**, Syracuse, N. Y., died Jan. 5.

Users of tubing for cylinder applications—now you can have this new...

J&L Cold Drawn ELECTRICWELD

Tubing with a Special Smooth ID Finish

Reduces your overall production costs in applications like these . . .

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This new drawn-over-mandrel grade tubing with its mirror-like inside surface finish is today busy helping manufacturers reduce or entirely eliminate costly machining on many applications and is being substituted for more costly types of steel tubing. For example, it may be used, without inside honing, for many cylinders through which plungers are passed.

J&L Cold Drawn ELECTRICWELD Tubing with a *Special Smooth* ID finish combines the physical advantages imparted by today's modern electric welding techniques with those of cold working. It withstands high internal hydrostatic pressures, carries heavy torsion loads, resists high-frequency vibration, and offers a favorable weight-to-strength ratio for applications in which loading occurs in all directions.

J&L Cold Drawn ELECTRICWELD Tubing can be furnished in its three specifications in OD sizes from ¾-inch to 2¼ inches and in wall thickness from 20 to 10 gage, 0.035 and 0.134-inch respectively.

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Airco To Expand

$16-million expansion of industrial gas-producing facilities paced by growing demand

TO MEET the rapidly increasing demand for industrial gases, Air Reduction Sales Co. is spending $16 million on its 1956 expansion program. Since 1951 (counting the '56 program), this division of Air Reduction Co. Inc., New York, has invested about $50 million in the gas-producing field.

It points up the confidence Air Reduction has in the anticipated increased use of industrial gases, says J. H. Humberstone, president of the division.

New Plants — Producing plants at Calvert City, Ky., Chicago and Alton, Ill., are scheduled for completion this year. Additional producing facilities will be installed at Butler, Pa., and output will be increased at Riverton, N. J. A portion of the appropriation will go toward expansion of gas-producing facilities in the Southwest. Additional distribution facilities will be established across the country.

The Chicago installation will produce liquid oxygen, nitrogen and argon and will be completed during the last quarter of 1956. The Alton plant is scheduled for completion by the middle of 1956.

The Calvert City plant will be the third the firm has built in that city. The first was National Carbide Division's calcium carbide and acetylene generating plant. Air Reduction Chemical Co. Division is completing a vinyl acetate monomer plant in the same area. The firm acquired 1500 acres of land in Calvert City to make plant sites available to customers.

Additional facilities at Butler, scheduled for completion by the last quarter of 1956, will about double producing capacity there.

Products — Oxygen is used extensively by the steel-producing, foundry and metalworking industries for metal refining, welding, cutting and metallurgical applications. Nitrogen is used widely by the steel, chemical, electronics and food-processing industries as an inert atmosphere where oxidation must be eliminated.

Argon is used primarily in the electronics industry and in the inert-gas, shielded-arc welding processes. The welding methods have found important use in the fabrication of assemblies for nuclear applications.

The rare gases of the atmosphere, such as neon, krypton and xenon, are used by laboratories and the electric sign industry.

New Equipment Broadens Illinois Gear & Machine Line

Heavy-duty gear drives for giant ore crushers and pulverizers, steel mill equipment, printing presses, machine tools and oil field drilling units are among the applications for gearing being produced by Illinois Gear & Machine Co. in a new building at its South Works, Chicago. Equipment has been installed for the manufacture of large hypoid, zerol and spiral bevel gears. Additional equipment for flame surface hardening, testing and lapping these gears has also been installed. Ample working space insures maximum efficiency

Pratt & Whitney Buys Die Firm

Pratt & Whitney Co. Inc., West Hartford, Conn., purchased Sterling Die Co., Cleveland, manufacturer of thread rolling dies.

Forms Alloy Processing Corp.

Alloy Processing Corp. (405 Second Ave., New Hyde Park, N. Y.) has been organized to do custom slitting. In addition, the firm is staffed with personnel experienced in rolling, leveling and related strip processing operations.

IBM To Build in California

International Business Machines Corp., New York, plans to build manufacturing, engineering and educational facilities at San Jose, Calif. One of the principal products to be made at the new plant will be electronic data processing machines incorporating IBM's "random access" memory device.

Lewyt Plans Expansion

Three corporations headed by Alex Lewyt will spend $10 million during the next five years in an expansion program which will triple research and development facilities and double production capacity. The program started last July with the $2-million purchase of the Ford instrument building in Long Island City, N. Y., from Sperry-Rand Corp. This building contains 315,000 sq ft of manufacturing space and is being enlarged by 43,000 sq ft. About $4 million will be spent in 1956.

Each company will get a new research and development laboratory, new testing and automatic spraying equipment. Lewyt Corp., maker of vacuum cleaners, will get new die-casting machines; Lewyt Air Conditioner Corp., maker of air conditioners, new production equipment; Lewyt Mfg. Corp., maker of electronic and electro-

mechanical equipment, new die-casting equipment.

Canco To Build in Oregon

American Can Co., New York, is building a container manufacturing plant at Salem, Oreg. The firm's plant in Portland, Oreg., "will remain the principal output source for Canco containers in Oregon," says R. C. Stolk, vice president in charge of west coast operations. Equipment, to be ready for initial production next spring, will have a rated capacity of more than 240 million containers annually. Cost: About $1 million.

Forms Warehousing Firm

Karl Adler organized Stanton Steel Corp., a warehouse specializing in flat-rolled steel products. The chief product will be sheet and tin plate. Mr. Adler's address is 50 26th St., Pittsburgh. He formerly was vice president of sales, Dumas Steel Corp.

Eaton Enlarging Plant

Eaton Mfg. Co., Cleveland, will add 38,000 sq ft to its Reliance Division plant No. 1 at Massillon, O. This "will permit greatly expanded manufacturing operations in three departments," says R. H. Daisley, vice president-administrative of Eaton Mfg. The program, costing about $400,000 for building and equipment, will be completed this summer. The division makes spring lock washers, various types of rings, cold-finished wire, thread-cutting screws, hose fasteners, bolted assembly items and nuts.

Kennametal Renames Subsidiary

T. R. Almond Mfg. Co., Willoughby, O., wholly owned subsidiary of Kennametal Inc., Latrobe, Pa., changed its name to Kennametal Co. of Ohio. Officers are: President, P. M. McKenna; vice president, A. G. McKenna; treasurer, G. J. Heideman; secretary, C. R. Van Norden; assistant secretary, R. J. Flickinger. Mark A. Rollinson has been appointed plant manager. The Willoughby plant has been equipped to produce the Kennametal line of mechanically held tools. The downtown Cleveland sales office of Kennametal Inc. has been moved to the Willoughby plant.

REPRESENTATIVES

Forklifts Inc., Harrisburg, Pa., was appointed to sell and service the line of fork-lift trucks, straddle carriers and powered hand trucks produced by the Industrial Truck Division, **Clark Equipment Co.**, Buchanan, Mich.

L. C. Keir Co., Seattle, was appointed sales agent in Oregon and Washington for the Metals & Fabrication Division of **Fansteel Metallurgical Corp.**, North Chicago, Ill.

Noorduyn Norseman Aircraft Ltd., St. Laurent, Que., was appointed sole Canadian sales agent for the Aircraft Division of **Ledkote Products of New York Inc.**, Long Island City, N. Y., maker of replacement exhaust systems.

NEW ADDRESSES

Cincinnati district sales office of **Jones & Laughlin Steel Corp.** and offices of J&L's Cincinnati warehouse moved to new quarters in room 1401, Carew tower, that city. The warehouse is at Front and Smith streets. W. F. Donaldson Jr. is district sales manager; H. B. Asquith, warehouse manager.

Weldaloy Products Co. moved to 11551 Stephens Dr., Van Dyke (Detroit), Mich. The firm's general offices are in one building, its foundry and metallurgical laboratory in another. Weldaloy produces alloys to customers' specifications, resistance welding electrodes, electrode holders, welding dies, fixtures, rod and bar stock and a variety of accessories for use in welding. The engineering department produces special sand and permanent mold castings and forgings for the electric-weld pipe and tube industry.

ASSOCIATIONS

LUDLOW KING
. . . asst. to exec. v. p., NMTBA

National Machine Tool Builders' Association, Cleveland, named Ludlow King as assistant to Tell Berna, executive vice president. The announcement was made by Louis Polk, president of the association and Sheffield Corp., Dayton, O.

Mr. King has had broad experience in industrial sales and government relations. Since March, 1952, he has been vice president of the Plastics Division, Universal Moulded Products Corp., Philadelphia, with headquarters in Washington.

William F. Scott, manager, Building Products Division, Virginia Metal Products Inc., Orange, Va., was appointed chairman of the **Steel Door Institute**, Cleveland. Five manufacturing companies are members of this organization.

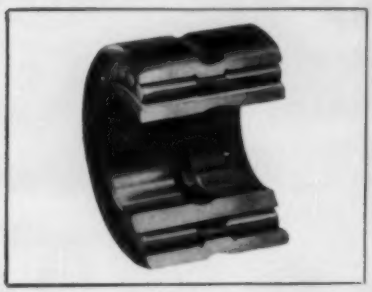
E. G. Swigert, president of Hyster Co., Portland, Oreg., was elected national vice president of the **National Association of Manufacturers**, New York.

Association of Steel Distributors Inc., New York, elected these regional chairmen: Saul Bradburd, Interstate Iron & Supply Co., Philadelphia, eastern region; Walter Ising, Laube Steel Co., Chicago, midwest region.

BEARING TIPS by McGill

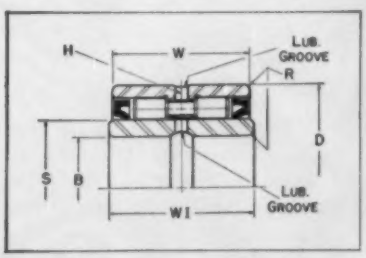
CAGELESS BEARING CORRECTS SKEWING

Guiderol Bearings carry greater loads in smaller spaces because they have no space wasting cages. A full complement of center grooved rollers extends the width of the race for maximum load support and a center guide rail avoids roller skewing that can bind a bearing under some loads. MT and CT series interchange dimensionally with ordinary needle bearings and cylindrical roller bearings.



First Sealed Full Type Roller Bearing Series

The SG series Guiderol bearing provides low-cost and flexible sealing where ordinary needle-type bearings with auxiliary seals have been too cumbersome and expensive. Interchangeable with the standard Guiderol bearing, the new SG series provides five sealing combinations.



140 Pages of Bearing Facts

Write for your copy of Catalog No. 52, a revised 140-page Bearing Selection Guide. It contains vital product information and 30 pages of engineering data.

GUIDEROL® BEARING CARRIES GREATER LOAD IN SMALL SPACE FOR McCULLOCH CHAIN SAWS

Bearings installed in 1944 still in use.

Load-carrying capacity in minimum space is given as the reason for using McGill Guiderol bearings on the heavy-duty loader made by the Farmhand Company. Four bearings support the shafts of the gear pump that furnishes hydraulic power to the loader. Guiderol bearings have been used by Farmhand since 1944 and virtually all of the loaders with the original bearings are still in use.

Assembly ease cited as an extra benefit

Rugged use in the field dictates rugged construction at the factory for McCulloch Motors Corporation gasoline engine chain saw units. The one-man and two-man chain saws must be light and compact but sturdy enough to operate at full capacity all day long.

Since switching to a McGill Guiderol Bearing as support for the crankshaft, McCulloch, like many machine builders, has proved that the Guiderol bearing provides the desired greater load capacity in small space and outlasts former units with minimum maintenance—important under rugged chain saw field conditions.

A bonus benefit is the ease of installation of the Guiderol bearing—with open ends and no end shoulders. Assembly is a simpler operation.

Insure performance with McGILL®

MULTIROL® GUIDEROL® CAMROL®
Full Type Roller Bearings

McGILL MANUFACTURING COMPANY, INC., 301 N. LAFAYETTE ST., VALPARAISO, INDIANA

STEEL

January 23, 1956

Technical Outlook

ACTIVITY IN TITANIUM—A Sendzimir reversing cluster mill for continuous cold rolling of titanium sheet up to 49 in. wide will be installed by Titanium Metals Corp. in an Allegheny Ludlum (one of the co-owners of TMCA) Pittsburgh-area mill. The $3-million facility will produce large coils of titanium rolled to extremely accurate gage tolerances and with a mirror finish. Another move on the titanium front: Mallory Sharon Titanium Corp. is having Westinghouse build a car-type (4 x 4 x 12 ft.) vacuum annealing and degassing furnace for titanium ingots and sheets. It's the largest of its type to be built and will be used in Mallory Sharon's Niles, O., plant.

BETTER INVESTMENT— Cast stainless steel impellers last three to five times longer when made by the investment process, says one pump manufacturer. Investment casting leaves complex, hard-to-reach surfaces smooth without machining or sanding. Added benefits: Better corrosion resistance, more efficiency.

ADHESIVES STICK TO IT— Helicopter rotors are the latest invasion of adhesives in the aircraft industry. Resin-adhesives were used to bond the two halves of 34-ft blades for Piasecki's military helicopter, the Turbo-Transporter. The two halves are shaped somewhat like clamshells; the interior is filled with aluminum foil to give added support.

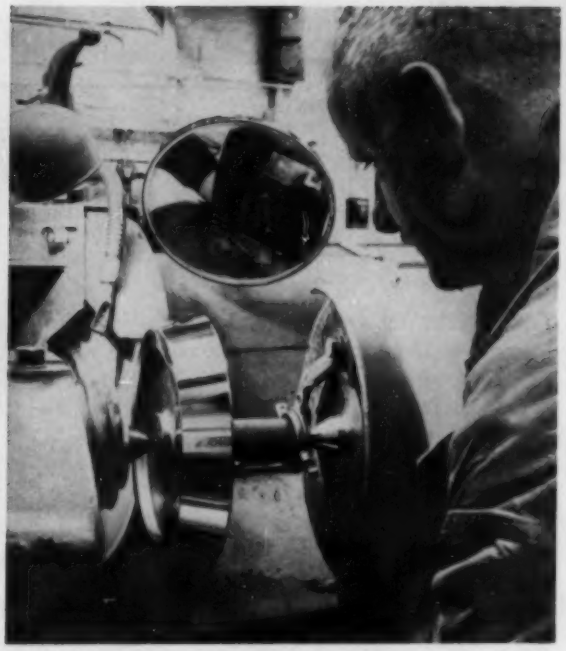
GADGET IMPROVES RIDE—Road shock dampers (not shock absorbers) mounted on each front wheel will smooth the ride in GMC light trucks. Using the principle of marchers breaking step on a suspension bridge, a weight bounces in a cylinder to offset wheel bounce. The weight, a 12-lb disc, is sandwiched between two coil springs in a 4.4 x 11.8-in. cylinder attached to the brake backing plate. The wheel bouncing starts the weight bouncing in the opposite direction. It is claimed that washboard roads no longer can make light trucks sashay out of control. Wheel vibration is reduced to a mere flutter.

WELDING PREDICTIONS— James F. Lincoln, Lincoln Electric Co., foresees six major developments in the immediate future: 1) Automatic welding machines more and more will take over hand operations. 2) Economical, homogeneous alloy deposition. 3) More variety in iron powder electrodes. 4) Greater speed and more improvements in gas shielding. 5) Increased welding of higher alloys with mild steel electrodes. 6) Hard surfacing of mild steel rails. Occasion: A meeting of the Cleveland Welding Society.

PLASTIC MAGNETS—Permanent magnets with a plastic binding can be pressed into many intricate shapes—more than are possible with casting or sintering methods. Inserts for temperature compensation, bearings and shafts can be included; no additional machining is required after molding. Outstanding features claimed are precision magnetic tolerances, lower aging requirements and, occasionally, cost reductions.

TRANSISTORS, TODAY AND TOMORROW— John Q. Public is going to find more transistors in his everyday life. Scott-Atwater says it is dreaming about small radar sets for outboard motors, electromagnetic compasses and boat-to-shore radio telephones. Chrysler's Imperial and Chevrolet's Corvette can be purchased with transistor radios. Pocket radios and hearing aids using these current misers have been available for some time.

Precision internal grinding requires carefully made machines. Pivots under the workpiece compensate for surface imperfection, permit finer adjustments for tapers



24-in. OD grinder will produce work accurate to within several millionths for straightness, 10 millionths for roundness and less than 2 microinches for surface finish

The Precision Touch in Grinding

By MIKE CURTIS
Timken Roller Bearing Co.
Canton, O.

Better gages bring the need for better grinding methods. Here is how one plant grinds out inches by millionths

ACCURATE production means more accurate gages. When production limits are within 75 millionths of an inch, management must think in terms of bettering 10 millionths for its gages.

Such accuracy requires a set of rules with no deviations allowed. Gages for Timken's tapered roller bearings are made possible by following the rules laid down by company engineers and American machine tool builders.

Rule One — Vibration is the greatest enemy of precision grinding. To eliminate it, you must work from the ground up. Obviously, you can't be next door to a forge shop.

Floors of reinforced concrete, 24 to 36 in. thick, should be separated from walls, pillars and posts—floating floor is the term architects use.

Machinery bases must be sturdy and level. All working parts should be mounted within the base dimensions with no overhanging ways or motor mounts. Tail stocks have to fit closely, yet move easily for adjustment.

Rotating parts must be precisely true. Pulleys have to be concentric within 3 to 5 ten thousandths. Make certain that motor armatures are balanced, belts flat and seamless. In some cases, it is best to mount the motor pulley first before balancing; setscrew tension can force a pulley out of round.

Motors — To insure maximum stability, motor legs are machined. The type motor—ac, dc or hydraulic—is important. OD grinders at Timken use a 1-horse, variable, dc motor for the wheel head. Direct-current motors have the virtues of little or no current pulsations and flexible speed control.

The wheel head slide on the ID grinder is force lubricated, and all moving parts are carefully machined for a metal-to-metal fit with neither press nor looseness.

The work head is checked by sweeping the face of the chuck with an indicator. A carefully ground hole in the center of the chuck facilitates checks with the wheel spindle—both axes must be

Samples of gages used to check tapered rollers and races. Closer production tolerances demand more and better master gages like these

Timken's Check List for Grinding to 0.000010-In.

Buildings:

1. Filtered and conditioned room air—45 per cent humidity, 70°F
2. Floating floors, reinforced concrete 24 to 36 in. thick, separated from pillars, columns and walls
3. AC and DC electric supply

Machinery:

1. Sturdy base
2. All working parts must be inside the base dimensions—no overhanging parts
3. Ways level and pressure lubricated
4. Close fitting tail stock
5. Built-in dwell at the end of each pass (work cycle)
6. All centers in line. Wheel center parallel and in the same plane as work centers
7. Pulleys balanced, accurate and true between 3 and 5 tenths
8. Hydraulic system accumulators to eliminate pulsation

Motors:

1. Machine legs to insure flat mounting
2. Balanced armatures to eliminate vibration
3. DC motors for OD wheel head
4. Hydraulic motor for ID work head
5. AC motor for ID wheel head

Miscellaneous:

1. Seamless belts
2. Sturdy diamond holder; diamond point on center of wheel
3. Dressing wheel speed higher than work speed; round corners by hand; remove loose wheel grit

parallel and in the same plane.

ID Chucking—The use of work head pivots on the face of the magnetic chuck permits finer adjustments of straight and taper ID grinds. If the work does not fit against the chuck absolutely flat and true, the magnetic force distorts the work. As long as the work is held in the chuck, the finish grind will be true. As soon as the magnetism is released, the workpiece will spring back to its original shape and distort the ground surface. Work head pivots compensate for such inaccuracies.

Meticulous precautions like these pay off in improved straightness and accuracy of the finished piece.

OD Musts—The table ways on OD grinders should be lapped and force lubricated.

Be certain that centers are perfectly aligned; otherwise, a concave piece generally results. Adjustments should be made to take up all motion and still be light enough to avoid bending of the work. The axis of the centers and the axis of the wheel must be parallel in the same plane.

When dressing the wheel, position the cutting point of the diamond on the center of the wheel. Remove all loose particles to avoid contamination of the work surface during grinding and round off wheel corners by hand. Wheel speed for dressing should be much faster than work speed.

It is best to buy grinders equipped with a dwell mechanism. The wheel should be permitted to come to a complete stop before recycling for the next work pass. Double inertia only adds distortion and inaccuracies.

Hydraulics — Machinery that uses hydraulically operated controls is subject to some inaccuracy. Gear pumps, valves and other pressure controllers, create waves and pressure variations. We installed accumulators to smooth the flow, got added benefits in accuracy.

The increased accuracy and quality of tapered roller bearings require an investment of hundreds of thousands of dollars in master gages. By grinding more precisely we have gained more gage life and reduced the number of master gages required.

The old bottleneck in millionths has become a moneymaker.

What Black Oxide Has To Offer

- Attractive, glossy or dull-black coat
- Durable, long-lasting finish
- Low cost
- Ease of application in inexpensive equipment
- One-bath, low-temperature process
- No dimensional changes
- Speedy processing
- No electrodes or complicated control tests necessary
- Excellent bond for painting or lacquering

Black Finish with a Bright Future

By THOMAS E. MURRAY
Service Engineer
E. F. Houghton & Co.
Philadelphia

BLACK OXIDE finishes, originally introduced as a substitute for plating during war material shortages, have found a permanent home in the finishing field. The furniture market, for one, has been using large amounts of black iron (some of the so-called wrought iron is really blackened carbon steel).

Simplicity—Ease of the process and booming demand have induced a number of metal processing plants to set up facilites for finishing tubing, rod and wire in this attractive durable coating. The Westmoreland Metal Mfg. Co., Philadelphia, is typical. It has installed a 1400-gallon blackening tank for producing black finishes on metal furniture components.

The operation at Westmoreland starts with coiled strip, coated with rust preventive. It is slit, formed and welded into tubing in a tube mill; then bent and assembled into furniture components.

Sequence—Prior to the blackening operation, the rust preventive, soluble oils and welding scale must be removed. This is done in an alkaline bath. A rinse and acid pickle follow. In some blackening sequences at other plants, the pickle is omitted.

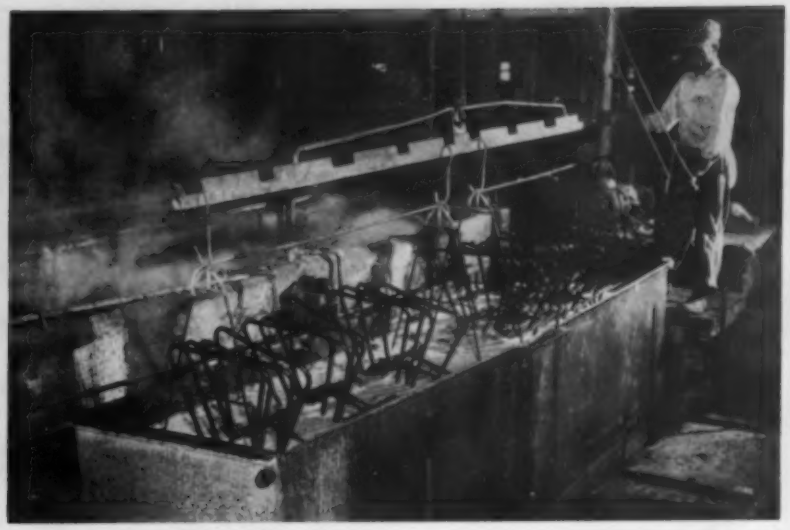
Blackening is done in an oxidizing alkaline bath which has a caustic soda base (Westmoreland is using Houghto-Black). It's a fast operation, taking an average of 10 minutes per part. The bath is held at 290 to 295°F. Because this is above the boiling point of water, it is necessary to replace water lost through evaporation. Temperature and water additions are controlled readily by an aquastat.

The blackening tank must be made of steel. No other metal must come in contact with the solution. The tank should be vented. Blackening is followed by cold and hot water rinses.

Rust Resistance — Black oxide has excellent corrosion resistance in indoor atmospheres. A chromic acid rinse following the blackening operation serves to further increase corrosion resistance of the metal surface and is frequently included as part of the process. It is customary to add a protective finish for outdoor use.

Application of a supplementary film consists of immersing the part in a clear rust preventive capable of producing a dry film, sometimes of a varnish type, sometimes a

First step: Cleaning



Last step: Rust inhibiting

waxy finish. A high luster film is usually preferred.

Black Look—Luster of the black coating depends on the condition of the treated surface. Polished or cold rolled, highly reflective parts will assume a lustrous glossy black appearance. Dull surfaces, such as are produced by pickling, will take on a dull jet black color.

Combinations of lustrous black with chromium, white metal or yellow brass plating have been worked out for decorative motifs. A maufacturing cycle as short as 10 minutes (from bare metal to finished black) points to the economy of the process.

Black Oxide Coating Is Simple

Operation	Tank Construction	Method
Cleaning	Drains needed for periodic cleaning of tank. Provision needed for adding water	Alkaline bath. Usual concentration of Houghto-Clean is 4-8 oz per gallon, but up to 16 oz per gallon may be used. Either electrolytic or soak cleaning at temperatures between 180° F and boiling can be used
Rinsing	Tank should be of overflow type and have steam coils or other means for heating rinse bath	Hot water
Pickling (optional)	Lead-lined tank for sulphuric acid; rubber lined for hydrochloric	10 per cent sulphuric at 120° F or 25 per cent hydrochloric acid for eliminating rust, scale and welding flux not removed in alkaline cleaner
Rinsing	Same as rinsing above	Hot water
Blackening	Steel tank only. Can be mild steel or boiler plate. Hood and exhaust system advisable in poorly ventilated rooms. Temperature control and water addition devices such as an aquastat needed	Oxidizing alkaline bath (at 290 to 295° F for Houghto-Black in 10 lb to 1 gallon of water concentration). Treatment cycle varies between 5 and 30 minutes (average: 10 minutes)
Rinsing	Overflow-type tank	Cold water
Rinsing	Steam coils or other means needed for heating bath	Hot water to hasten drying
Rinsing (optional)		Chromic acid to increase corrosion resistance
Rust prevention		Immersion in rust preventive capable of producing a dry film, such as wax or varnish

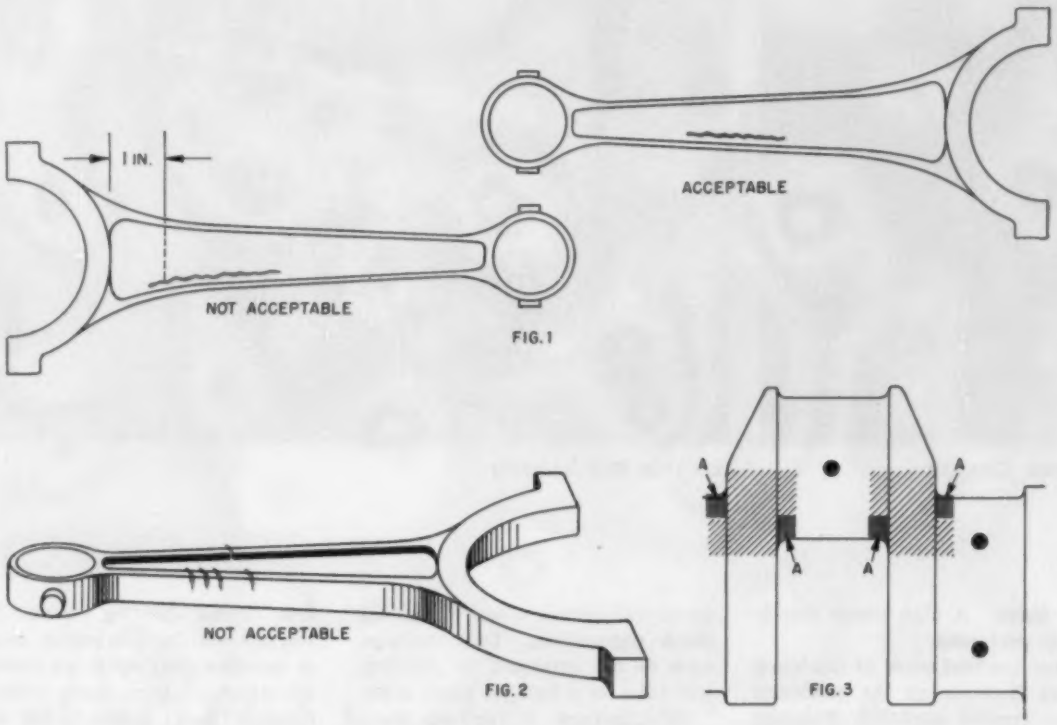


FIG. 1

FIG. 2

FIG. 3

Magnetic Particle Inspection:

Where Should You Draw the Line?

By J. B. CAINE
Consultant
Wyoming, O.

MAGNIFY ANYTHING enough and you will find imperfections. In a magnetic field, a discontinuity even one atom wide will attract magnetic powder and become just as visible as a discontinuity the unaided eye can see.

But no one dismisses magnetic particle inspection as being too sensitive and of no practical value. The orientation of tiny cracklike discontinuities in an area of high stress can cause service failure.

The narrower the discontinuity, the sharper the notch, the greater the stress concentration. Sharp, relatively deep cracks, though invisible, can increase stress concentration to values exceeding even a generous factor of safety.

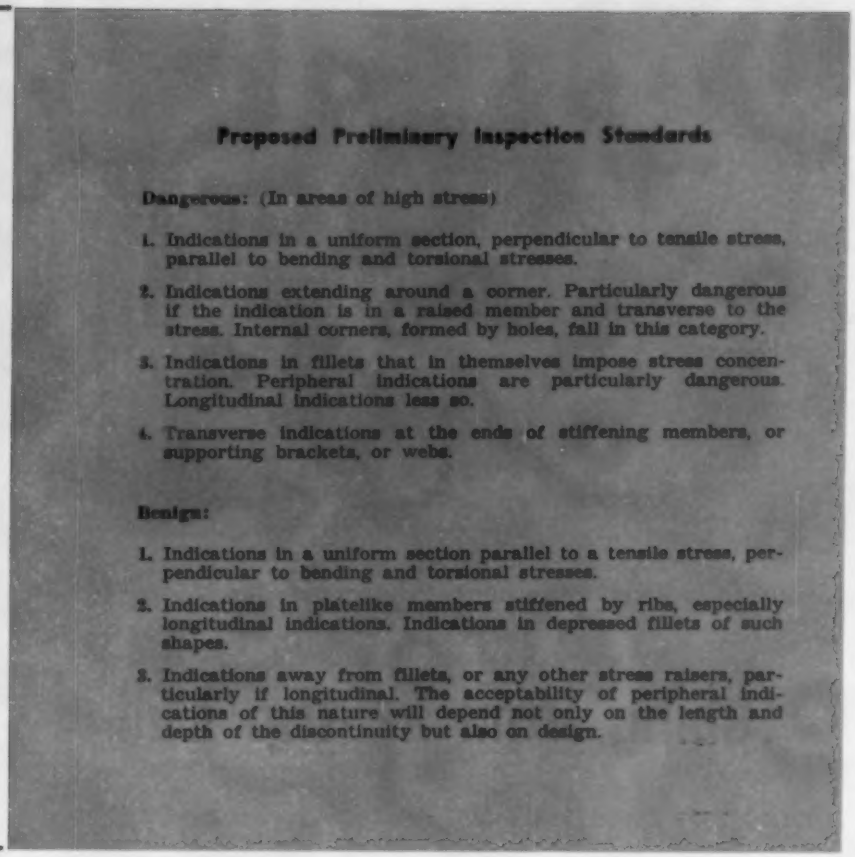
Standards Needed — Magnetic particle inspection is about the only testing procedure that does not have widely accepted standards, but a few companies have standards suited to their needs. A leading automobile manufacturer's standard for magnetic particle inspection under ultraviolet light for connecting rods reads:

". . . *any single longitudinal indication* not exceeding 2 in. in length and not within 1 in. of either end of the channel is acceptable (Fig. 1)."

Another specification of a leading maker of diesel engines mentions transverse indications and is applicable to larger connecting rods:

". . . *indications of transverse defects* in the rod flanges are shown in Fig. 2. Any defects in this direction and location reject the rod, since they usually result in failure.

". . . *indications of longitudinal laps*, seams or inclusions in the



Proposed Preliminary Inspection Standards

Dangerous: (In areas of high stress)

1. Indications in a uniform section, perpendicular to tensile stress, parallel to bending and torsional stresses.
2. Indications extending around a corner. Particularly dangerous if the indication is in a raised member and transverse to the stress. Internal corners, formed by holes, fall in this category.
3. Indications in fillets that in themselves impose stress concentration. Peripheral indications are particularly dangerous. Longitudinal indications less so.
4. Transverse indications at the ends of stiffening members, or supporting brackets, or webs.

Benign:

1. Indications in a uniform section parallel to a tensile stress, perpendicular to bending and torsional stresses.
2. Indications in platelike members stiffened by ribs, especially longitudinal indications. Indications in depressed fillets of such shapes.
3. Indications away from fillets, or any other stress raisers, particularly if longitudinal. The acceptability of peripheral indications of this nature will depend not only on the length and depth of the discontinuity but also on design.

I-beam section are usually considered harmless."

Common Ground—Both specifications agree that relatively large longitudinal indications in the web, and especially in the fillets of the I-beam junctions, are not harmful. Transverse indications and those originating at holes or corners of highly stressed areas are cause for rejection.

Although these specifications are for forged steel, the defects are still cracklike. There can be little question about applying the specifications to other ferrous metals, cast as well as forged. Longitudinal indications in the I-beam section of connecting rods can be safely extrapolated to other I-beam sections loaded in a similar manner.

This means that, within reason, longitudinal laps, seams and inclusions in wrought steel, and intercolumnar shrinkage and hot tears in cast ferrous metals can be considered benign when in the flange and I-beam junctions unless proved otherwise. This is especially true of indications away from the ends of the part that do not extend to an outer surface, or around corners.

Location Counts — The crankshaft is another highly stressed part covered by proprietary specifications that accept relatively large indications of cracklike defects in certain locations. Again, it is not the size of the indication, but its location and direction that are important.

Here are some pertinent points from one diesel engine manufacturer's magnetic particle specification. (Acceptance and rejection are based on service life data.)

"... *inclusions* have been highly overrated as causes for failures. We have never been able to definitely correlate a crankshaft failure with inclusions.

"... *Induction hardening checks*: Definitely established as harmless, insofar as the life of the crankshaft is concerned when away from the fillets and not over 1 in. long or 1/16 in. deep.

"*Fatigue cracks*: Circumferential indications in the center of the fillets should be viewed with extreme suspicion since they probably represent the start of fatigue failure of the shaft."

Compare—Another manufacturer of lightweight diesel engines has similar specifications for magnetic particle inspection of crankshafts, but the presentation is different.

In a typical crankshaft (Fig. 3) these indications are acceptable:

"*Bearing surfaces*: Surface indications less than 5/8 to 1 7/16-in. long (depending on type of crankshaft) are acceptable. Not over three to four indications per journal or pin.

"*Crank pin oil holes*: No surface or subsurface indications intersecting the 45 degree diagonal closer than 1/8-in. to oil hole, or entering oil hole chamfer.

"*Main bearing oil holes*: Surface indications less than 1/4 to 7/16-in. long (depending on type of crankshaft) that enter the chamfer are acceptable.

"*Critical regions* (shaded in Fig. 2): Within the most highly stressed area (A), indications less than 3/16-in. long that enter fillet, and indications less than 1/4-in. long closer than 1/8-in. are acceptable. Beyond area A, but still in the shaded area, indications 1/4 to 3/8-in. long are acceptable."

Short of Perfect—These specifications make sense. The slight differences in acceptance standards are probably due to differences in design factors of safety. The highly stressed areas of a crankshaft (shaded in Fig. 3) are self-evident. In these areas, especially in the fillets, almost no discontinuity is acceptable with low factors of safety.

The same is true around oil holes—areas of high stress imposed by design. In less highly stressed regions, a discontinuity can be quite large. In no case is absolute perfection demanded, even though the factors of safety in the case of Fig. 3 approach those of aircraft design.

Castings Comply—Magnetic par-

ticle inspection standards for cast parts are similar to those for forged parts. The chief difference is that complexity of the usual cast part makes visualization of the stress pattern difficult. But regardless of complexity, fundamentals of interpretation should be the same.

If an indication is found at a corner, it should be considered with suspicion. If even moderately stressed, the rupture will progress and ultimately cause failure. If the indication goes nowhere, it can be considered benign. This has been found true in service.

Preliminary Standards — These few examples illustrate parts highly stressed in tension, compression, torsion and bending. It seems possible to advance some preliminary standards based on these findings.

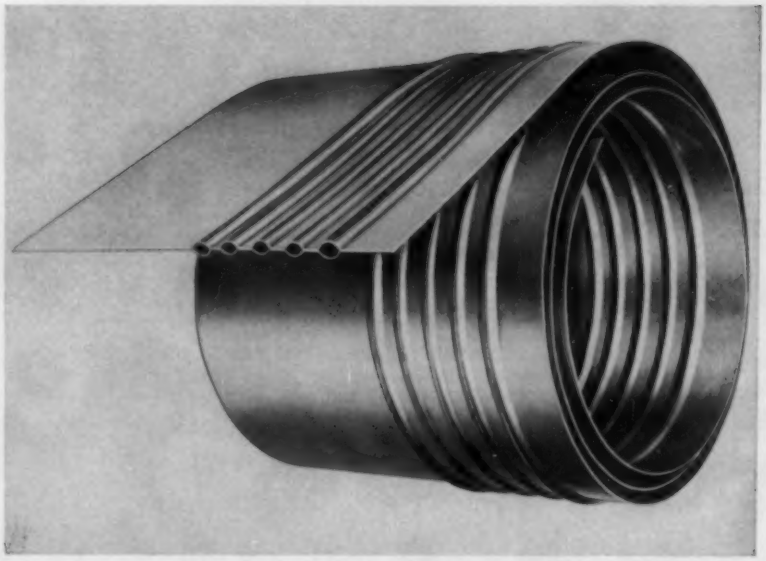
The standards (see box) apply to parts designed to normal factors of safety, say from two to five. Factors of safety under two are unusual in design (other than ordnance and aircraft) and can be considered special cases.

When in Doubt — These rules cover a surprisingly large number of shapes. In case of doubt, stress analysis can check the stress concentration in any part. A stress concentration study by brittle lacquer or strain gage techniques will give exact data.

If the indications are shown to impose areas of high stress, they are dangerous. If no high stress areas show up around the indications, or if areas of higher stress are shown to be present due to shape, the indications are most probably benign.

Service Tells — Unfortunately, the best criterion of the influence of a defect — service — is being neglected. If indications are found on a part which has performed satisfactorily in service, they should be used as data on relative stress concentration, not cause for summary rejection as is the almost universal practice.

Such indications are almost certain to be benign, and the proof is performance. The probability of harmful defects starting at the time of magnetic particle inspection is nil.



Stimulant to imaginative heat exchanger design is . . .

Tubing from a Strip Mill

HERE'S SOMETHING new with real potential, Dr. Richard A. Wilkins told STEEL last June at the Rome, N. Y., works of Revere Copper & Brass Inc. He patted a coil that looked like any other coil of copper strip—only it wasn't. If you looked closely at the cropped end, you could see what appeared to be a parting of the metal at regular intervals.

Put a needle in those spots, he said, apply air pressure and the strip will expand into a series of parallel tubes, connected by webs of solid metal, like the sample in the photograph above. You can easily vary size of the tubes or their distance apart. The material can be made virtually any length because it is formed on a rolling mill.

Competitive—What Dr. Wilkins, vice president in charge of Revere's Research & Development Department, had just pointed out, are major differences between Tube-In-Strip, as it has been named, and comparable materials with which it must compete.

Tube-In-Strip is ready for competition at a flat 12-cent-per-lb markup over the basic rolled metal price. It was introduced Jan. 10 with these suggested applications: Laundry dryers, cooling cabinets for electronic units, airplane fuselages, electrical conduit, radiant heating, air conditioning units, truck body panels, refrigeration, steam kettles, curtain wall heating and cooling—all applications in which heat exchange or integral stiffening is important.

It is being rolled in deoxidized copper, 85-15 and 70-30 brass and 1100 and 3003 aluminum. Stainless steel is coming. For convenience, the strip is shipped uninflated—the customer can inflate it easily.

Casting Born — The product starts out as a cast billet or slab, with cast-in rods of friable material that crush to powder when the slab is rolled. When the tubes are inflated, either by air or hydraulically, the powder is flushed out.

Tube walls come out half the thickness of the strip. By inflating between dies, tube cross section can take a variety of shapes. Tubes can be inflated on one side only, for instance, leaving one side of the strip flat.

RAMMING MIX BOOKLET

...that every steel man should have!

THIS new free booklet is the most valuable handbook on steel furnace bottom ramming procedures ever offered.

It will be mailed to you when you send the coupon below.

Many of the suggestions and recommendations contained in this 36-page booklet have come from our customers, who cooperated in joint studies in their open hearths and electric steel furnaces.

All of the recommendations are designed to help you obtain substantial savings and establish new performance records through the proper use of Permanente #165 Ramming Material and Permanente #84 Ramming and Patching Material.

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13. Coke-burning heat up methods.
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American Steel & Wire's wire rope flaw detector at work. The box around the rope contains the magnetic sensing element. The light colored box in the foreground is a paint spray gun to mark the position of flaws. Awaiting development: A portable or built-in version for checking cables in use

Wire Rope Gives Up Its Secrets

HIDDEN by lubricant or outer wires are three flaws the best of wire rope makers can miss: The one - in - a - million broken wire, kinked wire or bad weld. The American Steel & Wire Division of U. S. Steel has a device to do this kind of supersleuthing.

Call it a flaw detector (the company hasn't named it). Installed in wire rope mills at Trenton, N. J., and New Haven, Conn., it stands constant guard over any fluctuation in the quality of the product emerging from the closing die on the strander.

Detector—The sensing element is a magnetic coil. The rope is the core of the coil, so that any change in the character of the rope—even an off-diameter wire—causes a distortion in the magnetic field. This in turn creates an unbalanced electric current.

Amplified and fed to relays, the signal can trigger a flashing light, a bell, a spray gun to mark the flaw with a spot of paint or a pen on a recorder. Or it can shut down the machine. The recorder keeps a permanent record.

Helping Hand — This 100-percent inspection for rigid quality control in no way relieves the machine operator of his responsibility. Instead, it protects both operator and product against the possibility of human or machine error.

How seldom this occurs has been shown by experience in the mills. Sometimes the machines run for days before a flaw shows up. Even then it is likely to be one that doesn't impair the quality of the wire rope.

Toward Automation — The detectors are more than a first step on the way to automatic quality control. They are revealing some of the unknowns of wire rope making, such as where and why certain defects occur. Corrective action becomes quicker and more certain.

The next step, if need warrants it, is automatic correction initiated by signals fed back by the detector. The company is alive to such possibilities of automation wherever they augment skill and experience to help men do a better job.

MAKE EVERY HEAT COUNT!

with RECARB-X. for the ladle

- **FAST CORRECTION FOR OFF-CARBON HEATS** — a convenient 50-pound bag of RECARB-X tossed into the ladle will give two points of carbon pick-up per 100-tons of steel.
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- **IDEAL FOR QUALITY STEEL** — RECARB-X is consistently efficient at all carbon levels . . . effective in maintaining maximum rimming action on all high carbon rimmed heats . . . ideal for close carbon specifications.
- **HELPS THE MELTER** — RECARB-X added to the ladle will insure carbon specifications. RECARB-X gives the melter time to finish all heats to proper S, Mn, P, etc. specifications . . . and to tap at the best temperature.
- **SAFE** — no odor or flames to hurt workmen or damage equipment. Light 50-pound bag is easy to toss into the ladle.
- **ECONOMICAL** — RECARB-X is a profit-making investment. Keep your mill schedule. Put more heats into the soaking pit at exact carbon specifications. Make *every* heat count with RECARB-X.

Write for the RECARB-X bulletin today. Get the full facts and arrange a test . . . we will be happy to cooperate.

190

THE UNITED STATES GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION • SAGINAW, MICHIGAN

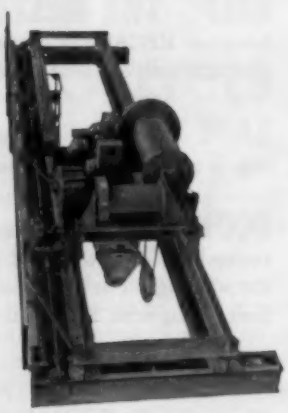
TAKE IT UP WITH R&M HOISTS-CRANES-WINCHES

BIG R&M CRANE MOVES STEEL FOR KILROY

R & M built this big 15-ton crane to lift and move structural steel—never a dainty, packaged commodity—with two-handed flexibility. Two 7½-ton R & M Type "F" Hoists, independently controlled from the cab of this double-girder, five-motor crane, eliminate dangerous load-balancing.

Maximum bridge deflection (loaded), ½". End truck length, 15' 2", wheelbase, 11'. Bridge speed, 250 fpm maximum. Bridge control, six-step variable speed. Bridge brake, foot-controlled hydraulic. Hoist lift, 20'. Lift speed, 20 fpm. Trolley control, four-step variable speed to 125 fpm. Total crane weight, 60,000 pounds. User, Kilroy Structural Steel Company, Cleveland, Ohio.

Pictured at right—45-foot span, 20-ton capacity R & M crane with 5-ton auxiliary hoist. Standardized cranes in single or double I-beam types available quickly in 20 to 65-foot spans; capacities to 10 tons.



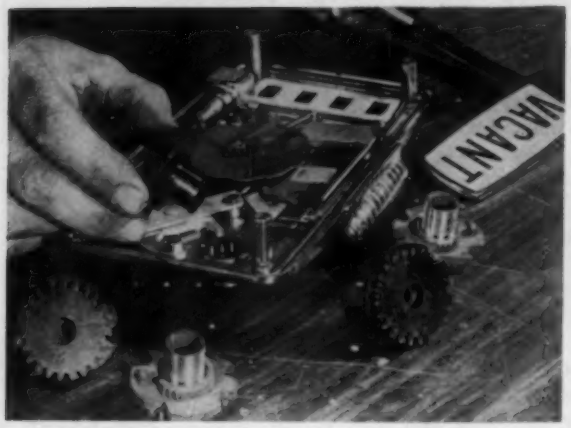
☐ Have representative call ☐ Send Bulletin No. 825-B

VENTILATORS MOYNO PUMPS HOISTS CRANES MOTORS FANS

ROBBINS & MYERS INC.

SPRINGFIELD, OHIO BRANTFORD, ONTARIO

Beryllium-copper cast parts used in taximeter (left to right): Flag indexing cam, brake actuating cam, ratchet hub, return lever cam



Details of the flag-actuating cam installation

Installing ratchet hub which operates "extras" tabulation

Beryllium Copper Pays Its Fare

TAXIMETERS, those busy devices that ring up your cab fare, get a lot of hard use. Parts must be durable and maintain dimensional tolerances through years of service to insure accuracy of results.

Viking Tool Corp., Belleville, N. J., found that beryllium-copper castings, in four different parts, did a better job than the steel and other alloys previously used.

Economical — While beryllium copper costs more than steel initially, the finished product costs less. Expensive machining is eliminated because tolerances of 0.0005-in. can be maintained in casting. Metal loss is nil.

The Viking taximeter has only 38 moving parts. It uses an electric clock instead of gears and springs for movement. Most gears and cams in the meter bear against steel pins and shafts. With steel castings, shafts wore rapidly, holes elongated and tolerances expanded, giving erratic meter operation.

Ratchet Hub—The use of beryllium copper in the ratchet hub shows the metal's superiority in this application. The hub operates the "extras" tabulation (the indication of the charge for additional persons), and is actuated by a lever which binds against the ratchet periphery of the part.

The center hole fits over a steel stud and has a minimum tolerance of 0.001-in. Anything above this results in too much play on the stud and causes the dial to flop around. Viking found it impossible to maintain this tolerance with steel. The added machining cost too much, and, even worse, the arm was continually breaking off.

Dimensions — Specifications require a hub of 0.250-in. -0.000 $+0.002$-in. Over-all diameter is 1 in.; thickness is 0.400-in. Operating as it does in an unprotected, moisture - laden atmosphere, the part is highly susceptible to corrosion. This is no problem with corrosion-resistant, beryllium-copper alloy.

Brake Cam—Another use of the alloy is in the brake actuating cam, formerly cast of zinc alloy, which

couldn't take the wear—it would change size as much as 1/16-in., break and come off the shaft.

The center hole in the cam is 0.251-in. in diameter with a tolerance of −0.000 +0.001-in. It has an over-all diameter of 1 in. and a thickness of 3/16-in. Viking uses Berylco 20C, made by Beryllium Corp., Reading, Pa., which, with heat treatment, gives a Rockwell C hardness of 37 to 43.

Heat Treat—To harden the part, it first is solution annealed at 1475°F for 3 hours and water quenched, then heat treated at 600°F for 2 hours and air cooled.

Viking is able to control the expansion caused by heating to within 0.002-in. This eliminates machining costs and pinpoints the part to the design specifications in the original cast.

All the beryllium copper parts are treated in this manner except the ratchet hub—its specifications require an alloy that is sufficiently hard in its nontreated state.

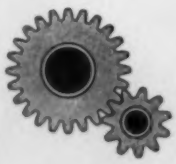
Key Part — The flag indexing cam is the pivotal unit which initiates the entire sequence of meter operation. Cast as a single part, it has lobes, teeth, ratchets, cams, a square tapered hole and a disengaging stop.

Steel couldn't be cast in this complicated design, and brass is too soft to take the beating. The tapered flag socket measures 0.628-in. −0.002 +0.000-in.

Return Lever Cam — Beryllium copper is used to cast the return lever cam which meshes with the flag indexing cam and forms part of the initial gear train. It has an outside diameter of 1.565-in., a pitch of 16 and contains 23 teeth with a circular pitch of 0.1963-in. Depth of the teeth is 0.1348-in.; their thickness is 0.098-in.

Used to reset the dollar and cents scale, this cam is under high spring tension at all times.

Test Runs—Every meter is given a test run of 2000 miles at accelerated speeds (120 mph) and 25 per cent overvoltage. It is run an additional 700 miles at regular conditions, including 3 hours of waiting time. After the test, Viking checks the dial readings, wear of parts and clearances.



MACHINE TOPICS

By R. F. HUBER, *Machine Tool Editor*

"ABOUT 44,000 of our so-called automatic screw machines are in operation. Of these, we don't know of any that are producing screws."

That's how Fred H. Chapin, president and chairman, National Acme Co., Cleveland, points up what has grown to be a sizable misnomer.

The error gets worse as new attachments and tooling innovations accumulate. It used to be these four-spindle machines, (later, six and eight) did turning, forming, drilling and boring, tapping and facing.

Out of a Hat—Tooling magicians have added to this repertoire by including milling, knurling, worm cutting and others. Even induction hardening is done within the machine cycle time.

With these new tooling gimmicks, Mr. Chapin says, "we're doing operations and jobs today that we'd never have thought of 15 years ago. The whole complexion of the multiple-spindle, automatic screw machine business has changed."

Mr. Chapin feels that as new tooling tricks are perfected the automatic screw machine will get a big boost from the automation trend; it won't be left behind.

Fully 80 per cent of National Acme's machines are sold with special tooling and attachments. While they retain inherent flexibility, they're becoming a true member of the special machine family. If there ever was a neatly drawn line between standards and specials, the line is fast dissolving.

Two examples of the machine's move into automation: A battery of five is taking a rough casting and turning out a finished automotive piston at about ten times the pace of its predecessor; another battery of five machines retired 44 old machines on an automotive rear-axle line.

Definitions

One of the inherent problems of a machine tool buyer is trying to decide precisely what is meant by what is said. Here is an abbreviated list of words that he wonders about: Precision, heavy duty, transfer, automatic and semi-automatic, sensitive.

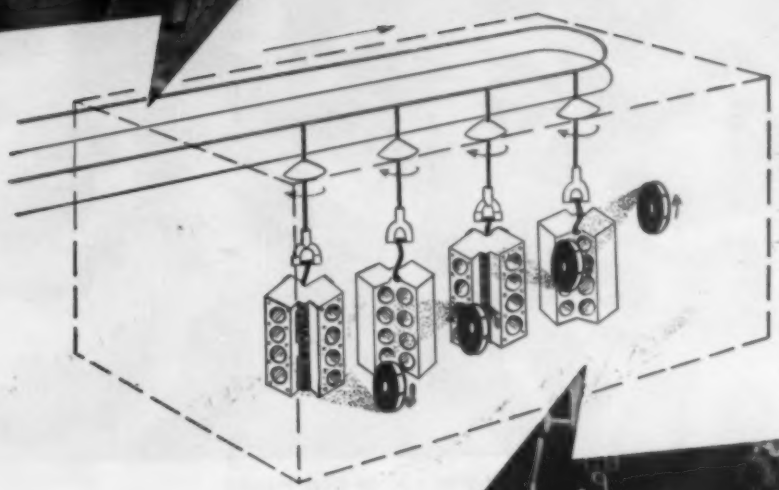
Despite recurring pleas by some users to get standard definitions for these descriptions, machine tool builders aren't sure there's any real problem.

They say their advice to the customer would be the same with or without standardization: Machines must be compared point for point. "As soon as machine tool buyers start to order on the basis of a machine title, some smart builder is going to call his the World's Best Engine Lathe, and he'll sweep the market."

Cutting Tip

The high-frequency screech that goes with machining thin-walled cylinders has grated the nerves of many a machine operator. At the Louisiana Ordnance Plant in Shreveport, where every workpiece is a potential ear splitter, the operator slips a coiled metal strip into the hollow core of the shell. Result: Silence.

10 Tons Per Hour Cleaned in this Wheelabrator Cabinet



non-stop blast cleaning

CUTS CLEANING TIME 50%

By consolidating their cleaning operations into a single Wheelabrator Monorail Cabinet, Superior Foundries, Inc. of Cleveland has cut cleaning time 50% and reduced the cost of repair parts 40%. All the work formerly done in three tumbling mills and two 14' blast tables is now cleaned in this machine at a saving of 15,000 man hours yearly.

The Wheelabrator Cabinet—a 2 pass, indexing, spinner-hanger type—cleans 10 tons of castings per hour in a steady flow without downtime for loading and unloading. Work hangers of special shapes and types carry a variety of castings, ranging from 5 lbs. to 600 lbs. each, within the blast stream of four Wheelabrator units. The work rotates within the blast of each unit for one minute to thoroughly clean even the most intricate castings.

The savings that can be made by consolidating cleaning efforts in Wheelabrator Cabinets are described in a 32-page Application Brochure. Ask for Catalog No. 724.

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Trail Blazer of Industrial Progress

A group of car-bottom heat-treating furnaces in a large steel foundry

Heat Treating Steel Castings

By CLYDE B. JENNI
Chief Metallurgist
General Steel Castings Corp.
Eddystone, Pa.

HEAT TREATING improves the mechanical properties of steel castings. By control of the chemical composition and use of the proper procedures a variety of properties can be achieved.

Benefits obtained: 1. Relief of internal stresses and strains. 2. Homogenization of structure. 3. Grain refinement. 4. Control of microstructures and needed mechanical properties. 5. Improved machinability.

These improvements give the right combination of mechanical properties to make steel castings important engineering components in many applications.

Stress Relief

Stresses and strains may be set up in castings during production. These may result during the solidification stage, during shakeout and during later operations, such as repair welding.

It is best to have as nearly a stress-free condition as possible before placing the piece in service. This is especially true when service requirements involve repeated stresses or fatigue loading, sudden impact loads, rapid changes in temperature or stress-corrosion conditions.

Insurance — Castings frequently are given a stress-relieving heat treatment soon after shakeout to insure safer handling during the remaining steps in processing. This is desirable if complex shapes are involved or if alloy steels are used.

During welding, the solidification of the weld metal is accompanied by a contraction in volume which sets up internal stresses, often of considerable magnitude. If the yield point is exceeded, warpage or

distortion results. A stress-relieving heat treatment is needed in many cases to reduce the likelihood of distortion during machining operations or during service, especially if creep at elevated temperatures is involved.

Homogenization

The solidification of liquid steel in a mold is initiated at the mold-cavity surface by the chilling effect of the mold material. Particles of solid or "crystal nuclei" grow more or less uniformly in several directions towards the center of the mold cavity. As the crystals grow, their size and shape are influenced by the temperature gradient in the metal, the lines of heat flow peculiar to the mold and the presence of neighboring crystals. A dendritic structure with primary axes followed by secondary and ternary axes usually forms. As the temperature gradient approaches zero and the remaining liquid composition becomes enriched in elements, other than iron, crystals again may form with random orientation.

Heterogeneous—Slow cooling in large cross sections and high pouring temperatures will produce coarse dendrites. Impurities (such as inclusions) also cause the dendrites to develop. As solidification proceeds, the liquid remaining becomes increasingly enriched in elements, such as carbon, phosphorus, manganese, etc., and a heterogeneous composition results. The segregated material is found in the interstices of the dendrites.

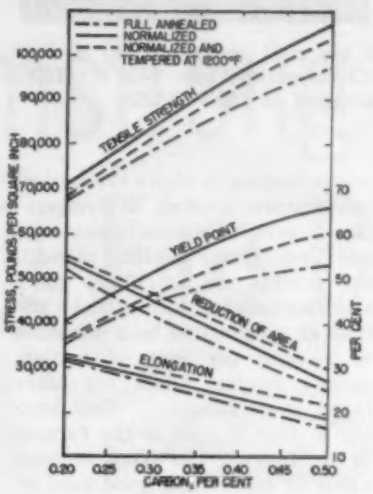
As the cast steel cools through the temperature zone between the solidus and the zone of secondary crystallization, the dendrites and large grains undergo a process of granulation and break up into austenite grains. Some of the inhomogeneity of composition is eliminated by diffusion. Most of the segregation is not diffused.

Preliminary Treatment—The microsegregation may be further diffused by heat treatment and a measure of homogeneity restored. While complete homogeneity by diffusion is desirable, such a state is never attained even at high temperatures because of the slow rates of diffusion of the various elements.

A preliminary heat treatment is often of value because the response to subsequent heat treatment is indirectly influenced by the as-cast structure. This relation is principally due to segregation. A desirable fine-grain structure is achieved when a preliminary heat treatment has restored some of the inhomogeneity.

Grain Refinement

The austenitic grain size in some cast steel is coarse, especially in heavy sections. As secondary crystallization occurs, the transformation into an aggregate of ferrite and pearlite in hypoeutectoid steels results in a network structure or a coarse Widmanstatten or acicular structure, depending on the rate of cooling. A large grain size in the original austenite is favorable to the development of the Widmanstatten structure.



Comparison of the full annealed, normalized and normalized and tempered properties of medium-carbon cast steels

The Widmanstatten structure and the coarse network type of cast steel give low ductility and impact values. One of the primary reasons for heat treating is to eliminate this structure and to give a fine-grained metal with its improved ductility and impact values.

Composition — Grain size and grain refinement are influenced by composition. The presence of alloying elements, such as chromium, nickel and molybdenum, has marked effects on grain refinement. Probably the most effective elements in grain-refining tendencies are vanadium and aluminum; titanium also acts as a grain-refining element. Aluminum frequently is used in steelmaking; residual aluminum contents of 0.001 to 0.05 changes the steel from a coarse-grained to a fine-grained material.

Comparison — A fine-grained casting has good mechanical properties and considerable notch toughness or shock-resisting ability. A large-grained structure has greater hardenability and better machinability. It's also better for elevated temperature service where strength and creep-resistance are needed.

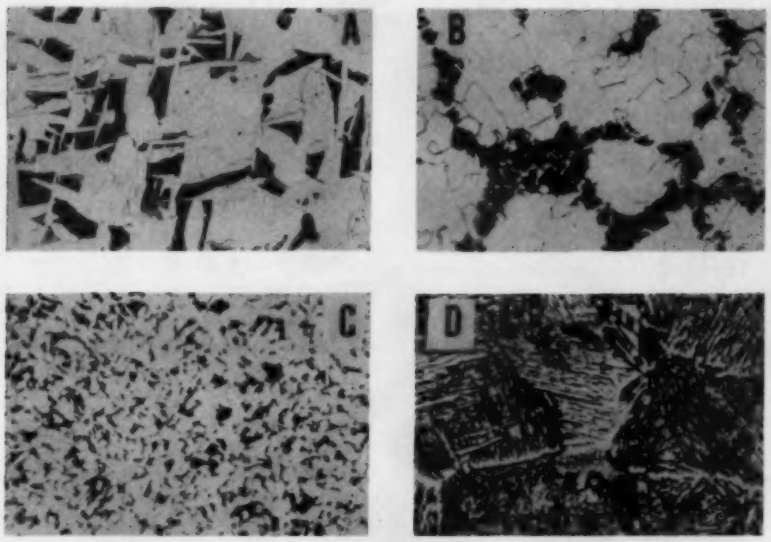
See the photomicrographs on page 86 for a comparison of cast steel structures produced by heat treatment.

Microstructure

The fundamental variable controlling the microstructure of heat-treated cast steels is the temperature at which the transformation of austenite takes place during the cooling cycle. This transformation temperature is influenced by the rate of cooling. A slow rate of cooling of medium carbon castings or moderately alloyed ones gives a dendritic blocky ferrite and pearlite structure. A more rapid rate of cooling gives a random blocky ferrite and pearlite structure. A still more rapid rate of cooling gives a Widmanstatten ferrite and pearlite structure. Rapid cooling (quenching) gives martensite.

In most cases, transformation occurs over a range of temperatures and mixed structures result. As the cooling rate is increased, the ratio of ductility to strength is increased; a maximum is obtained by quenching to martensite followed by tempering. The mechanical properties of the casting are influenced by its microstructure and this is governed by the heat treatment employed.

The table on page 88 shows typical composition, heat treatment and tensile strength of a group of representative cast steels. Sound metallurgical practices are essential for building into the casting



Photomicrographs of a low carbon (0.18 per cent) cast steel: (A) as cast (X100); (B) 1700°F full anneal (X100); (C) normalizing from 1700°F (X100); (D) quenched in water from 1700°F and tempered at 750°F (X500)

the most desirable microstructure for the service required.

Machinability

Microstructure has a definite effect on the machinability of cast steels. It is possible in some cases to improve machining characteristics as much as 100 to 200 per cent through a heat treatment which alters the microstructure.

Heat treatment for optimum machinability cannot always be used, since strength requirements and service conditions also must be considered. The heat treatment must be chosen which will give the needed properties, at the same time considering production requirements, tool and time savings, etc. The best compromise possible should be made.

Heat Treatments

The commonly used heat treatments for steel castings are annealing, normalizing, quenching, tempering and stress relieving. Most steel castings are normalized or normalized and tempered. Annealing, once in wide use, is used only in some special cases. Liquid quenching and tempering received great impetus in the production of cast armor and is superseding normalizing and tempering in a number of cases.

Annealing — Full annealing involves heating to above the critical temperature, holding at temperature to permit solution to austenite and then slowly cooling through the critical range. (While many specifications require that the time at temperature be a minimum of 1 hour per inch of section, shorter holding times are often found to be feasible.) Slow cooling is usually done in the furnace or by burying the piece in lime, ashes or some other good heat insulator. This treatment may be used to refine the grain, to soften for machinability, to relieve stresses and to improve toughness.

Normalizing — This is similar to annealing except that the castings are cooled in still air. Normalizing gives a higher strength and hardness than annealing, with little change in ductility. The normalizing treatment generally is used for low-alloy cast steels since the effectiveness of the alloys is enhanced. The effect of annealing, normalizing and normalizing with tempering is illustrated in the graph on page 85.

Quench and Temper — Liquid quenching and tempering is a means of controlling the properties of a given steel within rather broad limits. By rapid cooling, martensite—the hardest product obtainable for a given carbon content —is formed. Reheating the martensite produces a dispersion of fine carbide in ferrite and leads to a gradual softening and toughening of the steel. This treatment yields a desirable combination of high strength and high ductility.

Castings usually are normalized or annealed prior to the quenching treatment to give a preliminary grain refinement and some degree of homogenization. The heating and holding cycle, as in normalizing, produces austenite. Then the casting is cooled rapidly in a liquid bath. Water is the commonly used quenching medium since most steel castings are in lower carbon ranges, 0.35 C and under. Oil is used for higher carbon contents. Good circulation of the liquid is required for uniform cooling rates and efficient heat removal.

Results—Quenching and tempering improves the strength-ductility and yield-tensile ratios, increases the efficiency of the alloys, decreases the notch sensitivity (increases impact strength), improves the properties in heavy sections and increases hardness.

The design of castings must be considered before a drastic water quenching is used. Castings having intricate designs or great differences in section should not be direct quenched because of the danger of cracking or distortion which may result from excessive stresses being generated. In some cases, special delayed quenching, an interrupted quench technique or spray quenching are useful.

Tempering — Tempering, following quenching or normalizing, is used to remove stresses set up in the castings during the rapid cooling of nonuniform sections. Tempering also increases ductility and impact resistance with a slight decrease in tensile and yield strength of the hardened steel. Hardness also is generally reduced.

The temperatures employed range from 400 to 1275° F, depending on the hardness and other mechanical properties needed. It is usually good practice to use as high a temperature with as short a time at temperature as are consistent with the properties required. When tempering follows normalizing, the castings are cooled either in the furnace or in the still air. When tempering follows liquid

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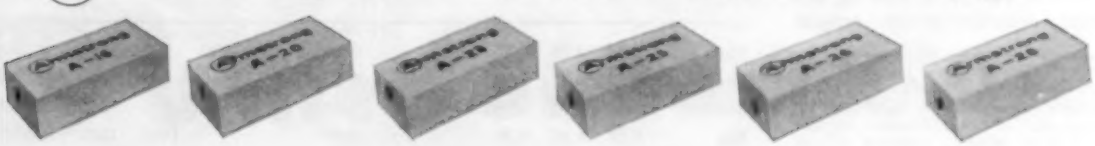
Armstrong INSULATING REFRACTORIES



quenching the castings are frequently again quenched to develop better impact resistance by avoiding temper embrittlement.

Stress Relieving—The stress-relief heat treatment involves the heating of the castings to a temperature below the critical point and holding at temperatures for a sufficient time to substantially reduce the stresses. Temperatures in the range of 1000 to 1200° F normally are used. Both time and temperature are factors in stress relieving, but the influence of temperature is greater than that of time at temperature. Stresses also are relieved in the annealing heat treatment and in tempering after normalizing or liquid quenching.

Hardenability — Cast steel and wrought steel of similar composition have similar hardenabilities. Thus, data on the hardenability of wrought steel can be applied to steel castings. Since cast steels are completely killed steels they have higher silicon and aluminum contents and often higher manganese contents; at the same carbon level cast steels will show slightly higher values on the end-quenched test.

The isothermal transformations of cast and wrought steel also are quite similar. S-curves developed for wrought steels can be used in the heat treatment of cast steels.

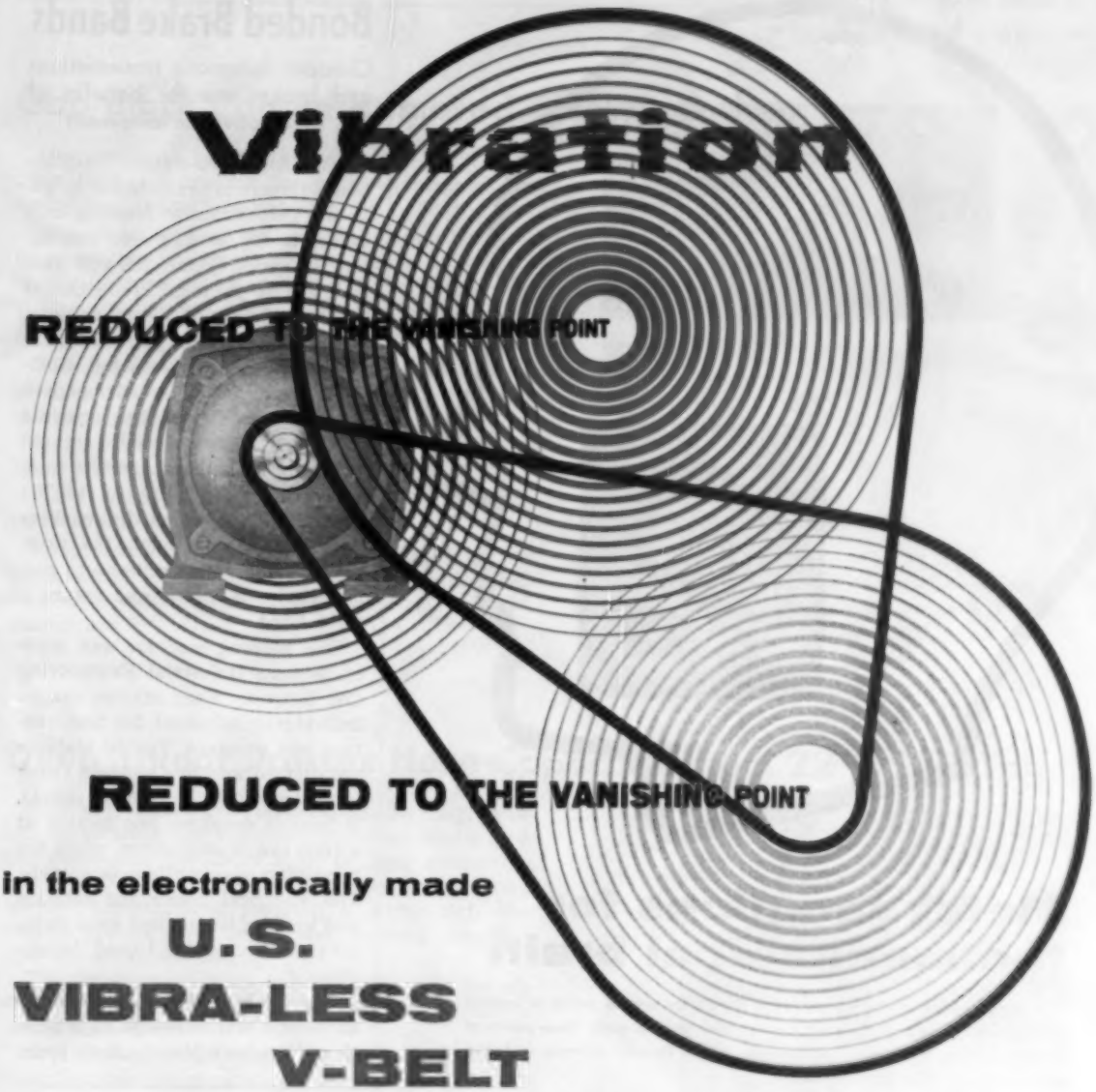
Equipment

Most steel castings are heat treated in batch lots in car-type or stationary batch-type furnaces. Semicontinuous furnaces are used to advantage if a long-run production of a particular casting is involved. Furnaces should be equipped with adequate instrumentation to maintain close temperature control and should receive careful maintenance. Close temperature control is of special significance in tempering furnaces; forced-draft recirculating furnaces are frequently used. In all furnace operations, care must be taken to avoid flame impingement. Combustion should be controlled, so that neither excessive scaling nor excessive decarburization results.

Typical Composition, Heat Treating Temperatures and Tensile Strengths of Cast Steels

Type Steel	Approximate Composition %						Heat Treatment °F				
	C	Mn	Si	Ni	Cr	Mo	Anneal	Normalize	Quench	Temper	Tensile Strengths psi
Low C	0.17	0.74	0.40				1650				65,900
Low C	0.17	0.74	0.40					1650			66,000
Low C	0.17	0.74	0.40					1650		1250	64,500
Low C	0.17	0.74	0.40					1650	1550	1250	67,000
Med. C	0.30	0.60	0.36				1650				74,200
Med. C	0.30	0.60	0.36					1650		1250	73,000
Med. C	0.30	0.60	0.36					1650	1550	1250	78,800
Med. C	0.30	0.60	0.36					1650	1550	1100	89,400
High C	0.42	0.72	0.41				1650				84,250
High C	0.42	0.72	0.41					1650		1250	83,900
High C	0.42	0.72	0.41					1650	1550	1250	93,800
High C	0.42	0.72	0.41					1650	1550	1250	105,000
1330	0.30	1.50	0.35					1650		1200	95,000
1330	0.30	1.50	0.35					1650		1000	100,000
1330	0.30	1.50	0.35					1650	1575	1200	103,250
1330	0.30	1.50	0.35					1650	1575	1000	126,200
8030	0.30	1.25	0.35			0.15		1650		1200	97,000
8030	0.30	1.25	0.35			0.15		1650		1000	100,000
8030	0.30	1.25	0.35			0.15		1650	1575	1200	115,000
8030	0.30	1.25	0.35			0.15		1650	1575	1000	160,000
8430	0.30	1.50	0.35			0.35		1650		1200	105,000
8430	0.30	1.50	0.35			0.35		1650		1000	112,000
8430	0.30	1.50	0.35			0.35		1650	1575	1200	120,000
8430	0.30	1.50	0.35			0.35		1650	1575	1000	165,000
8630	0.30	0.80	0.35	0.50	0.50	0.15		1650		1200	97,000
8630	0.30	0.80	0.35	0.50	0.50	0.15		1650		1000	100,000
8630	0.30	0.80	0.35	0.50	0.50	0.15		1650	1575	1200	115,000
8630	0.30	0.80	0.35	0.50	0.50	0.15		1650	1575	1000	160,000
2% Ni	0.25	0.75	0.35	2.00				1650		1200	92,500
2% Ni	0.19	0.75	0.35	2.00				1650		1200	82,000
2% Ni	0.19	0.75	0.35	2.00				1650	1650	1200	96,000
2% Ni	0.19	0.75	0.35	2.00				1650	1650	1000	110,000
Ni-Mo	0.20	0.75	0.35	1.90		0.35	1750				78,000
Ni-Mo	0.20	0.75	0.35	1.90		0.35		1750		1200	84,000
Ni-Mo	0.20	0.75	0.35	1.90		0.35		1750	1550	1200	90,000
Ni-Mo	0.30	0.75	0.35	1.50		0.30		1650		1200	90,000
Ni-Mo	0.40	0.75	0.35	1.80		0.28		1650		1200	110,000
Cr-Mo	0.25	0.75	0.35		0.75	0.30		1650		1250	86,300
Cr-Mo	0.35	0.75	0.35		0.75	0.40		1700		1200	96,000
Cr-Mo.	0.35	0.75	0.35		0.75	0.35		1650	1600	1250	111,500
Mo	0.25	0.75	0.35			0.55		1650		1250	77,500
Mo	0.30	0.70	0.30			0.50		1650		1250	82,000
Mo	0.40	0.80	0.35			0.50		1650		1250	90,000
Mo	0.28	0.83	0.35			0.50			1650	1250	94,200

• *Extra copies of this article are available in quantities from one to three until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, O.*



REDUCED TO THE VANISHING POINT

in the electronically made

U. S. VIBRA-LESS V-BELT

The new U. S. VIBRA-LESS Belt brings new efficiency to washing machines, driers, belt-driven fans, air conditioners, machine tools, grinders and a host of other applications. Electronic tension and a new molding method are the reasons why.

Electronic Tension process builds the pulling cords into the belt by error-proof electronics, instead of by mechanical means. All cords are placed and spaced with scientific accuracy—to guarantee that each pulls its full share of the load, thereby prolonging belt life. Each cord is of equal tightness, for exact uniformity and greater reliability.

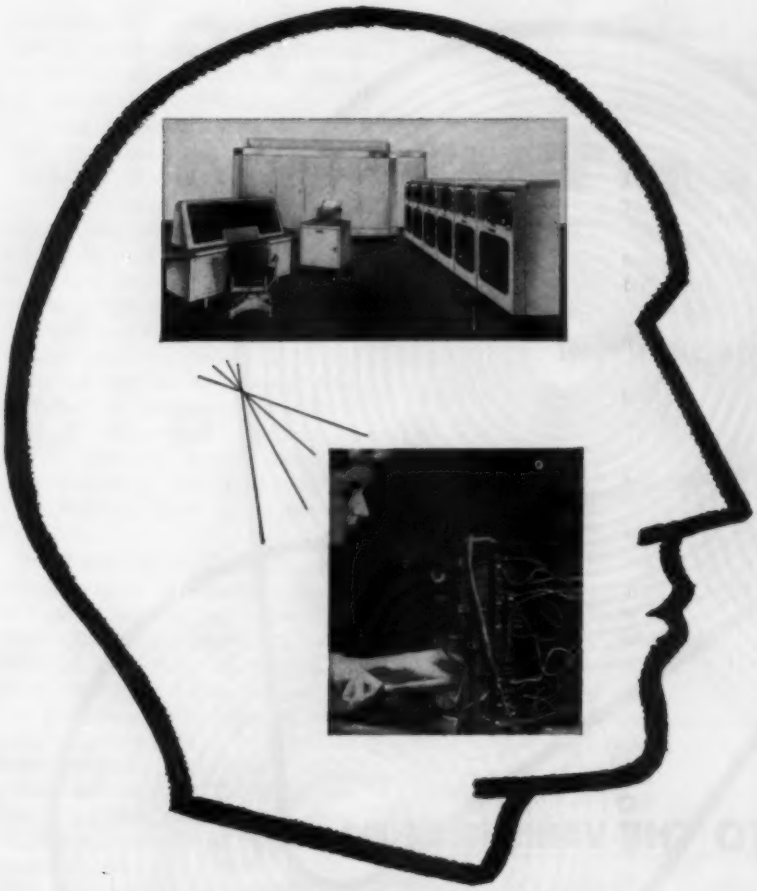
And along with Electronic Tension, "U. S." has introduced a new method of molding which produces a smooth surface with no high spots or imperfections. Consider what this means to high-precision machinery.

The new U. S. VIBRA-LESS Belt is so superbly accurate and uniform in construction that it runs with a smoothness and a silence never before encountered on a V-Belt drive. It reduces wear and tear on pulleys and bearings, prolonging belt life and drive life, and the equipment on which it is used. VIBRATION IS IMPERCEPTIBLE, thanks to the unfailing accuracy of these new developments. More information is obtainable through any of the 27 "U.S." District Sales Offices. Or write us at Rockefeller Center, New York 20, N. Y.

US RUBBER

Mechanical Goods Division

United States Rubber



Metal ganglions for the mechanical brain

The nerve centers of modern electronic computers are the points of contact that permit the flow of electrical current from part to part. These points of contact must be firmly and permanently joined. Usually, delicate soldering operations are used for this purpose.

The electronics industry requires many tons of fine solders. The Federated Metals Division of American Smelting and Refining Company is a major producer of these solders.

Federated solders are the result of many years of research and development. Typical of advances made by Federated research are patented Castomatic bar and ingot solders. Made on automatic casting machines, controlled by electronic instruments, each bar or ingot is identical in size, shape and weight, with uniform composition unequalled by other methods of casting. Every bar gives the same results in the user's hand.

No matter what size, shape or composition you may need in a solder, think of Federated first as a source of supply. Our broad experience with all kinds of non-ferrous metals has earned us the name of Headquarters for Non-Ferrous Metals.

Federated Metals

DIVISION OF AMERICAN SMELTING AND REFINING COMPANY
120 BROADWAY, NEW YORK 5, N. Y.
In Canada: Federated Metals Canada, Ltd., Toronto and Montreal

Federated first in the non-ferrous field AMD

Aluminum, Anodes, Babbitts, Brass, Bronze, Die Casting Metals, Lead, Lead Products, Magnesium, Solders, Type Metals, Zinc Dust

Bonded Brake Bands

Cheaper automatic transmissions and brakes are the benefits of this automotive development

A ROTARY, 30-station machine bonds linings to brake bands quickly and automatically. Needing only one man for loading and unloading, it uses regular 220-volt current and 90-psi air. Production is 180 to 240 bonded bands an hour.

The operator first places a brake band and an adhesive-coated, molded lining on a segmented mandrel. Air pressure forces the segments apart and applies pressure to hold the lining tightly against the metal band. Heat (400 to 450°F) hardens the bonds as the machine rotates. At one point, the pressure is temporarily relieved to permit gases to escape and insure a tight bond.

The bonding machine was made by Modern Industrial Engineering Co., Detroit. Each station can be individually adjusted for temperature and pressure. The 30 stations are divided into five sections (each is controlled by a central panel). If trouble develops, one section at a time can be shut down, while the remaining ones continue to operate. The electrical power for rotation and heating is supplied by a circular power rail at the top of the machine.

The brake bands are made for automatic transmissions in Warner Gear Division's Muncie, Ind., plant.

Welding Dollars

YOU CAN WIN cash for those ideas on how to accelerate progress in arc welding. The James F. Lincoln Arc Welding Foundation is offering a top prize of $5000. Nineteen other winners will share $15,000.

There are no restrictions as to the nature or type of suggestion. All residents of the U. S. and its possessions are eligible. Ideas are to be submitted on or before July 30, 1956.

For complete information and rules, write to the James F. Lincoln Arc Welding Foundation, Cleveland 17, O.

Gap Block Can Be Removed on New Lathes

Oversize work can be turned on 15, 18, 21½ and 26-in. lathes. Removing the gap block increases their swing sizes to 22, 27, 32 and 37 in.

The all-geared-head lathes have 12 spindle speeds in geometric progression. The spindle is mounted rigidly in three precision antifriction bearings.

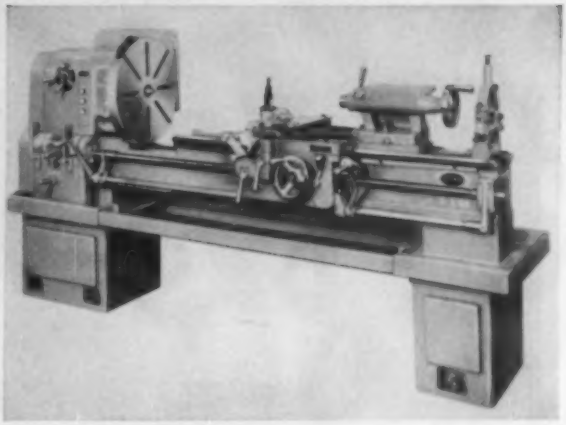
All headstock bearings are pressure lubricated with filtered oil.

The two smaller lathes have 48 thread and feed changes; the larger ones have 54 changes. The quick-change gearbox is lubricated automatically.

A 3-hp motor powers the smaller machines; the larger ones have a 5-hp motor.

The apron is a double-walled casting with automatic lubrication.

Longitudinal and crossfeeds are engaged by drop levers which operate positive jaw clutches. A spindle start-stop control lever is at the apron and quick-change box.



The ways are ground and will be flame-hardened if desired. *Write*: Cincinnati Lathe & Tool Co., Cincinnati 9, O. *Phone*: Redwood 2121

Deep Throat Presses Have Capacities from 22 to 150 Tons

Here are presses that do blanking, forming, drawing, perforating, combination die and automatic feeding operations for short runs or high production.

A front-to-back crankshaft makes space-saving, enclosed construction possible; a wider slide and longer gibbing provide greater support for wide dies and off-center loading.

The driving mechanism is concealed within the all-steel frame. Gear and clutch members operate in sealed baths of oil.

By enclosing all gearing in the press frame, overhung bearings are eliminated. The rigid support minimizes shaft deflection.

Multiple V-gibs hold the slide in accurate alignment and lengthen die life.

A heavy crown section, deep bed and a solid bridge between the gibs combine to form a rigid tie between uprights.

Geared presses use an electropneumatic clutch with an air-releasing brake for fast, smooth operation. There are no friction members to slip, heat up or wear.

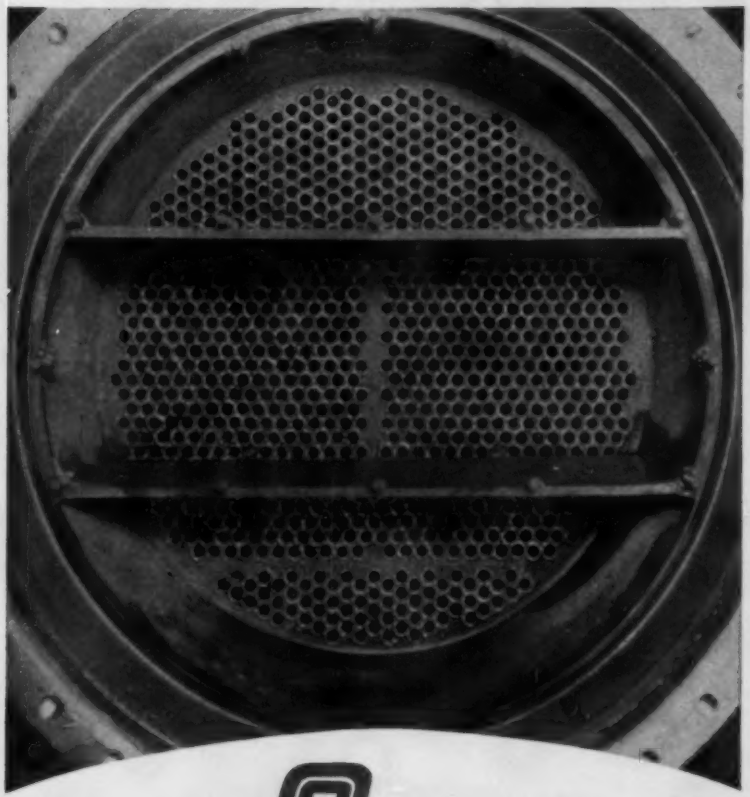
Nongeared presses use a sleeve clutch and drag brake.

The clutch has 14 engaging jaws to distribute the load over a large striking surface.

Crankshafts are cut from high carbon steel forgings, heat treated for toughness and durability.

Foot controls and engineered feeders for automated setups are available. *Write*: Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, N. Y. *Phone*: Taylor 4070

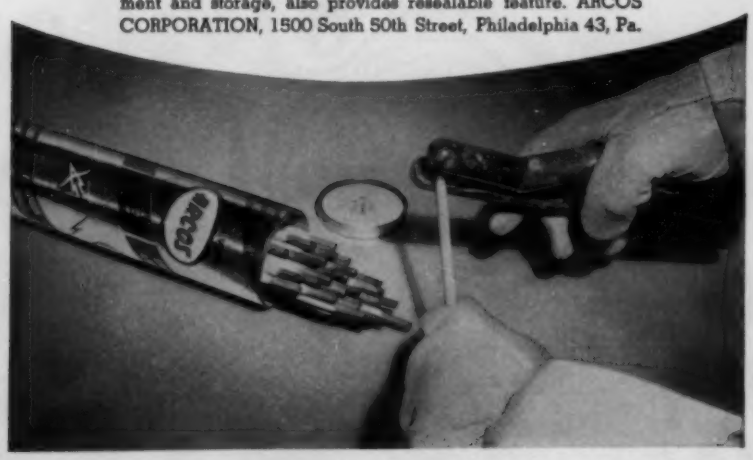
Save time, money and worry when welding stainless steels



WELD WITH ARCOS

STAINLESS ELECTRODES

Arcos controls in manufacture guarantee highest quality weld metal easily deposited. Widest electrode selection in the industry enables you to meet accurately the physical, chemical and metallurgical requirements of every job. Special ELECTRO-PAK prevents moisture pickup and chipped coatings in shipment and storage, also provides resealable feature. ARCOS CORPORATION, 1500 South 50th Street, Philadelphia 43, Pa.



NEW PRODUCTS and equipment

Hopper Conveyor

Small parts from screw machines, centerless grinders or automatic cutoff machines are conveyed, then discharged into tote boxes and bins or to a belt conveyor.

The unit loads from its own hopper to a box-type trap where steel drag plates on the conveyor's chain belt keep the trap closed at the bottom to prevent spilling, overflow and clogging.

A ¼-hp motor with a right-angle reducer powers the unit. *Write*: Metzgar Conveyor Co., 409 Douglas St. N.W., Grand Rapids 4, Mich. *Phone*: Glendale 6-1751

Broaching Machine

This high-powered vertical machine for internal or surface broaching has an unobstructed worktable.

The 22-in. square table will handle practically any size workpiece

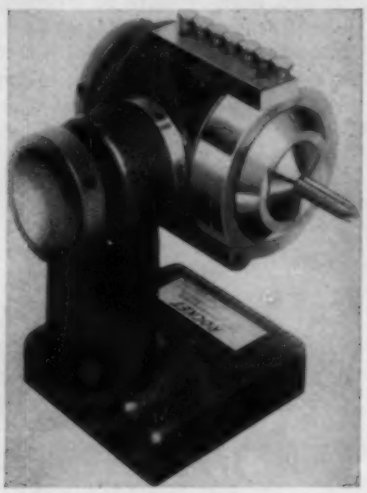
or broaching fixture.

The hydraulic machine comes in 6 and 8-ton models. The stroke is adjustable up to 30 in. Variable cutting speeds range up to 23 fpm. Return speeds go up to 70 fpm.

A mounting space 22 x 43 in. is needed; the machine weighs about 2400 lb. *Write*: Pioneer Broach Co., 6434 E. Telegraph Rd., Los Angeles 22, Calif. *Phone*: Raymond 3-4536

Tap Sharpener

Taps, either right or left-hand, with two, three or four flutes, can be sharpened in minutes. The sharpener can be used on any grinder with a magnetic chuck.



Pushbuttons control indexing. The head adjusts quickly from 0 to 90 degrees of angle to the grinding wheel.

Added height of the upright member of the base gives greater clearance for the head pivot.

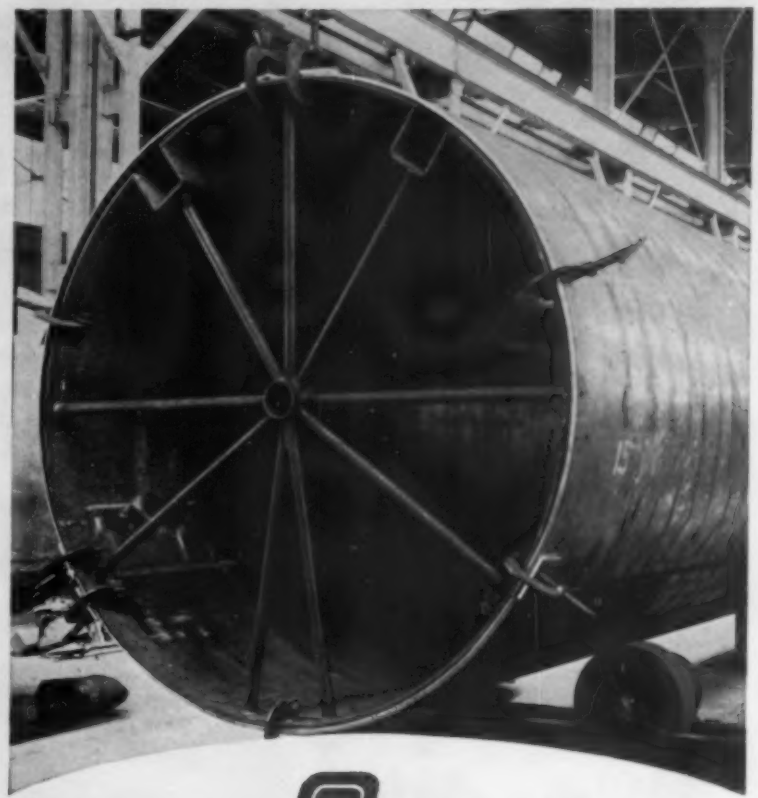
The sharpener, equipped with a ½-in. collet, will take standard 5-C collets of ⅛ to 1-in. capacity. *Write*: Rockford Tool & Die Works Inc., Rockford, Ill.

Appliance Motor

Washers, dryers, food waste disposers, dishwashers and ironers can use this new fractional horsepower motor.

It is interchangeable electrically and mechanically with the former design, but it is 24 per

How to improve quality on every aluminum job welded by inert gas



WELD WITH ARCOS

ALUMINUM SPOOLED WIRE

The advantages of aluminum weld-fabrication are many. But only a quality weld metal can produce them with maximum benefit. Arcos manufacturing controls applied to ALUMAR Spooled Wire are a sure guarantee. Within a critically controlled range you can meet every characteristic with "peace of mind". ARCOS CORPORATION, 1500 South 50th Street, Philadelphia 43, Pa.

cent lighter, more compact and is cooled by five times more air through the windings.

A new insulation system gives 3500 per cent more moisture resistance and is 800 per cent stronger.

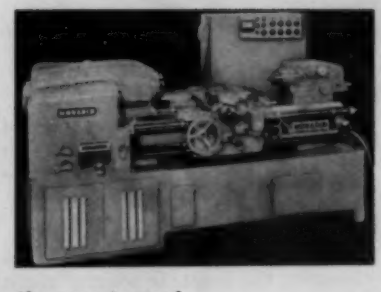
A 64-per-cent increase in hookup space on the terminal board makes it easier to connect leads. *Write*: Appliance Motor Dept., General Electric Co., Schenectady 5, N. Y. *Phone*: 4-2211

Electrical Preselector

Machining time and operator effort are reduced on any work run of two or more pieces.

The operator can preset motor speeds and gear ranges. He can obtain the speeds and ranges automatically by indexing a selector switch.

The machine's main drive motor changes rapidly to the proper shift speed; the headstock gears shift hydraulically to the desired range; and the drive motor accelerates to the preset speed.

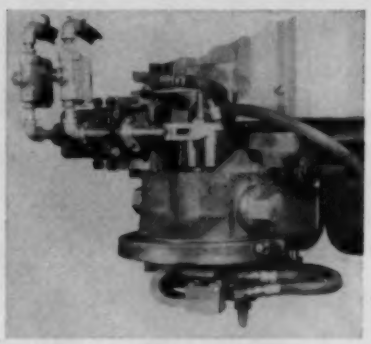


Readjustment of drive-motor speed and shifting of headstock gears for each new cut are eliminated in the production of duplicate pieces. *Write*: Monarch Machine Tool Co., Sidney, O. *Phone*: 2-1381

Stitch Welding Head

Spot welding electrodes guided by this head are said to give contoured seam welds previously unobtainable on automatic equipment.

More freedom in product design is allowed; either spaced or overlapping spots on any contour pattern may be used.



The stitch head may be mounted on any press welder; it replaces the upper electrode.

Operating speed is up to 100 spots a minute. Highest electrode force is 4000 lb. Pattern radius is from ½ to 3 in. *Write*: Taylor-Winfield Corp., Warren, O. *Phone*: 2252-1

Dust Collection

This centrifugal separator has high separation efficiency.

The collector consists of an inlet chamber connected to a nest of vertically mounted separating tubes, a dust-collecting hopper and a clean-gas discharge chamber.

Shape of the inlet head and design of the guide vanes cause the

"Doc, dermatitis control is simple as 1-2-3-4-5."

An exaggeration?

Not at all. Occupational skin irritation can be prevented. Simply. At surprisingly little cost.

— with the WEST Dermatitis Prevention and Control Program that:

1—insures personal cleanliness
2—protects exposed skin areas
3—prevents clothing contamination
4—guards against special hazards
5—provides continuous consultation.

Workers free of skin irritation can save you hundreds, perhaps thousands, of dollars each year — by eliminating the cost of:

—medical treatment
—enforced idleness
—absenteeism
—sacrificed quality
—lowered morale
—production lags.

The WEST Program for controlling skin irritations is based on individual shop requirements and an in-your-shop survey, made without obligation. Let a WEST representative plan the details.

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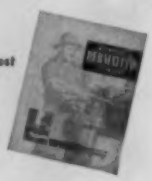
FREE BOOKLET

Use your business letterhead to request our 24 page booklet "The Control of Dermatitis in Industry."

WEST DISINFECTING COMPANY
Dept. S, 42-16 West St.
Long Island City 1, N. Y.



In Canada: 5621-23 Casgrain Avenue, Montreal

"SAND SCREEN's" unique open-mesh construction lets removed material flow *right through*...instead of loading or glazing, like conventional paper and cloth. What's more, *both* sides are usable—give you 7 to 15 times longer life. Use "SAND SCREEN" wet or dry, by hand or machine. It tears and folds easily to any desired size. Cut sheets fit oscillating or vibrating machines. "SAND SCREEN" Discs give best results when used wet with CARBORUNDUM's FASTCUT® Pad 85 Assembly. Try it—see how it slashes polishing and finishing costs in your shop. For a free sample, call your CARBORUNDUM Distributor or salesman, or write The Carborundum Company, Niagara Falls, N. Y. In Canada: Canadian Carborundum Company, Ltd., Niagara Falls, Ont.

Through product quality and application "know-how"

CARBORUNDUM

REGISTERED TRADE MARK

continually puts more sense in your abrasive dollar

C 4

HOW TO PROFIT FROM NEW IDEAS in your use of specialty steels

The men above are discussing how Carpenter's *Specialized* Warehouse Service has enabled them to get four times longer life from these punches.*

What about your use of specialty steels? Are you looking for ideas aimed at greater returns . . . savings . . . simplification . . . problem solving? They're all possible with Carpenter's *specialization* on the job.

Lead-off man is the Carpenter Representative. His knowledge and experience can help you make the most from every pound of tool, alloy, or stainless steel you use. And he's backed by Metallurgical Counsel from the Reading Mill.

In addition, a call to the order desk in the Carpenter mill-branch warehouse serving you provides fast information on prices, sizes and grades. Service literature to simplify countless daily procedures is yours for the asking. And it's all supported by the advantage of working with top quality steels that carry producer responsibility *directly* to you.

Shift your specialty steel program into high gear now. Simply call your nearby Carpenter Mill-Branch Warehouse, Office or Distributor. *The Carpenter Steel Co., 139 W. Bern St., Reading, Pa.*

***Carpenter Specialization saved money**

The punches were breaking after producing only 10,000 to 25,000 carbon rings. Production downtime to replace punches was 40 minutes. After calling in a Carpenter Representative improvement came fast. His recommendation to use Vega tool steel was followed. Now these punches turn out about 100,000 rings. Thus Carpenter's specialized warehouse service has eliminated four out of five replacements of punches costing about $50 each.

Carpenter STEEL

Mill-Branch Warehouse Service

IMMEDIATE DELIVERY from large stocks of specialty tool, alloy and stainless steels.

gas to whirl in the space between the inner and outer shell of the tube.

The unit will remove boiler fly ash or any process dust. *Write*: Hagan Corp., 323 Fourth Ave., Pittsburgh, Pa. *Phone*: Court 1-4772

Flaw Tester

Laminar flaws in metals, "cupping" in bolts, brazing defects and similar discontinuities are detected by this ultrasonic-transmission device.

A part is put in a liquid and continuous ultrasonic waves are passed through it. Discontinuities are translated into a meter reading.

Acceptance and rejection limits are established by destructive tests and visual inspection of parts with low readings. *Write*: Branson Instruments Inc., 430 Fairfield Ave Stamford, Conn. *Phone*: Davis 3-4907

Viscosity Control

Dip tank temperature is held to ±1 °F with a dip controller. Besides holding viscosity constant, paint consumption is compensated for.

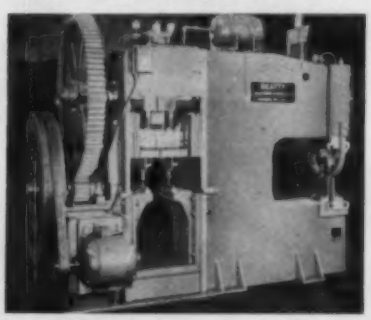
The dip controller combines an explosionproof heater and a precision, liquid temperature controller.

Dip tanks up to 600 gallons can be controlled at temperatures between 70 and 100°F. *Write*: Spee-Flo Co., 720 Polk Ave., Houston, Tex. *Phone*: Blackstone 0461

Beam Punch

Holes up to 1¼-in. in diameter can be punched in 1 in. thick material with this punch.

It will punch I-beams in three passes instead of five. End-for-end turning of beams is eliminated.



The punch is of 100-ton capacity. Mounted in an open throat are high dies for punching webs of beams, angles, channels and flat plates.

The guillotine portion of the machine has two overhanging bolsters with tools for punching holes in flanges on either side of the web. *Write*: Beatty Machine & Mfg. Co., Hammond, Ind.

Static Balancing

Two machines simplify the balancing of impellers, blower wheels, flywheels, fans, pulleys and other parts without integral shafts.

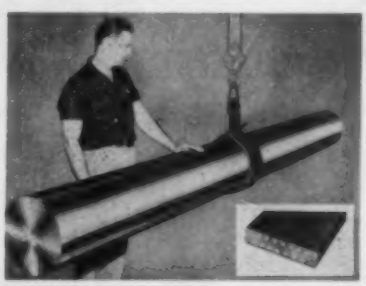
One model handles parts that weigh from 1 to 20 lb, with diameters up to 20 in. The other handles parts of the same diameter weighing 5 to 75 lb.

A large meter indicates the amount of static unbalance. Angular positions are pointed out by a stroboscopic lamp.

Working areas and controls are designed for operator's convenience to give high production on close tolerance work. *Write*: MacDell Sales Division, Balance Engineering Co., 850 W. Lake St., Chicago 7, Ill.

Woven Wire Slings

Highly finished stock can be handled by slings covered with plastic or Neoprene.



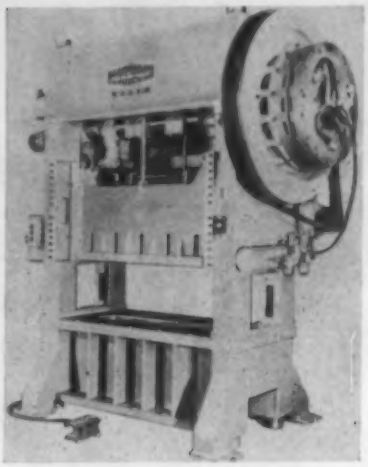
The effect of the covering on the flexibility of the sling is negligible; slings can be used in either basket or choke hitch. *Write*: Cambridge Wire Cloth Co., Cambridge, Md. *Phone*: Cambridge 1033

Presses

Two lines of double crank presses have box-type rams, large bed areas, steel construction, low inertia clutches and electrical controls.

Capacities range from 30 to 150 tons.

High speed blanking presses have variable speed drives up to 300 strokes a minute.



Geared models make 50 strokes a minute, and the flywheel press operates at 100 strokes a minute. *Write*: Johnson Machine & Press Corp., 620 W. Indiana Ave., Elkhart, Ind. *Phone*: 2-7515

USER SAYS TAP LIFE UP 43% ON THIS THIN-WALLED CASTING

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FERROCARBO®

Users everywhere report similar experiences. In fact, on 67 machining tests in 11 large machine shops, castings of gray iron treated with FERROCARBO averaged 89.5% greater machinability per tool than untreated castings. These premium castings are finer-grained, denser, stronger, yet they COST YOU NO MORE... because your foundryman, using FERROCARBO, makes worthwhile savings in raw material costs.

FOR FREE BOOKLET on FERROCARBO, citing actual case histories of faster machining, with longer tool life, write The Carborundum Company, Dept. 56, Niagara Falls, N.Y.

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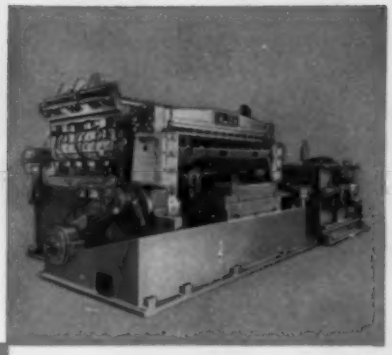
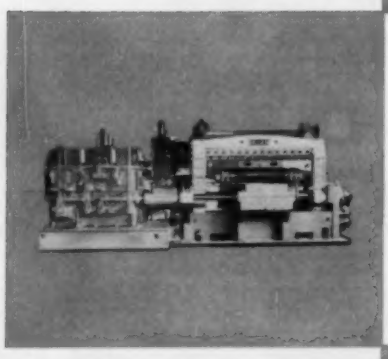
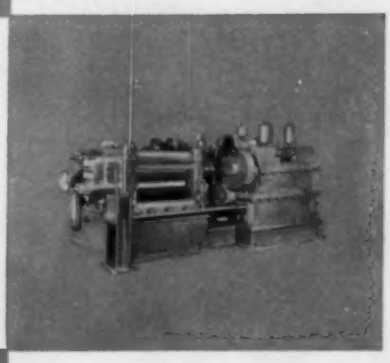
flexible design

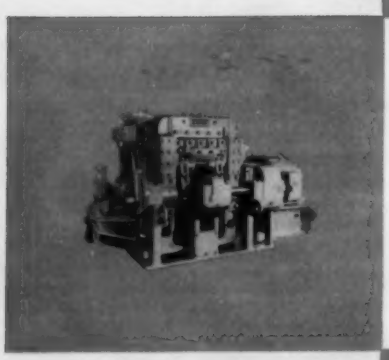




cutting accuracy

continuous feed





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by HALLDEN

"the shearing specialists"

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THOMASTON, CONNECTICUT

Sales Representatives

The Wean Engineering Co., Inc., Warren, Ohio (Ferrous)

T. E. Dodd, Pittsburgh, Pa. (Non-Ferrous)

W. H. A. Robertson & Co., Ltd., Bedford, England (Ferrous & Non-Ferrous)

NEW Literature

Write directly to the company for a copy

Industrial Clothing

Acid and chemical resisting clothes are described in a 1956 catalog, 16 pages. Dept. 100, Worklon Inc., 253 W. 28th St., New York 1, N. Y.

Carbide Tipped Tools

Illustrations of the proper use of carbide tools and descriptions of tools make up catalog 850C, 12 pages. Besly-Metro Division, Besly-Welles Corp., Beloit, Wis.

Beryllium-Copper Strip

Alloys, tempers, sizes and tolerances of precision strip are given in bulletin 6, 12 pages. Penn Precision Products Inc., 501 Crescent Ave., Reading, Pa.

Hole Punching

Equipment for hole punching and notching is presented in a 36-page catalog. Punch Products Corp., 3800 Highland Ave., Niagara Falls, N. Y.

Rope Fittings

A line of fittings for wire rope and chain is presented in catalog 950-1, 28 pages. Thomas Laughlin Division, American Hoist & Derrick Co., Portland 6, Me.

Cast Alloy Steel

Properties and uses of ten cast steels deoxidized with titanium are described—10 pages. Superior Steel & Malleable Castings Co., Benton Harbor, Mich.

Rubber Linings

Corrosion, abrasion and contamination resistant linings for tanks, pipe, vaves and storage and process equipment are described—bulletin 7115, 12 pages. Manhattan Rubber Division, Raybestos-Manhattan Inc., Passaic, N. J.

Ball Bearings

Dimensions and dynamic capacities for over 300 standard radial ball bearings and over 50 other standard ball bearings are tabulated in condensed catalog 1955-56-C, 4 pages. Engineering Department, Miniature Precision Bearings Inc., Keene, N. H.

Gas Cutting

A machine for oxyacetylene shape cutting with multiple torches is covered in form ADC 707, 20 pages. Air Reduction Sales Co., division of Air Reduction Co. Inc., 60 E. 42nd St., New York 17, N. Y.

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WEIRTON

high carbon strip cold-rolled spring steel

for high-speed blanking or forming

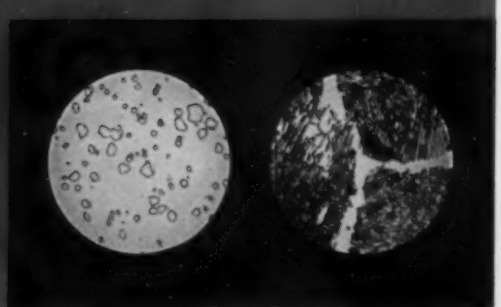
Where high fatigue-resistance is a principal factor, Weirton cold-rolled spring steel furnishes high carbon strip in the consistent uniformity necessary to meet the most exacting requirements of a wide variety of products. The close manufacturing control featured at Weirton results in several unique and highly desirable qualities—such as accurate response to heat treatment . . . uniformity of gauge and width . . . uniform chemical and physical properties . . . exact consistency of grain structure . . . controlled decarburization limits.

Pearlitic and spheroidized structures are available with desired chemical analyses and for specific heat treating and hardness. When you call Weirton you call for easier blanking and cold forming. And, at Weirton, you get what you call for.

WEIRTON STEEL COMPANY

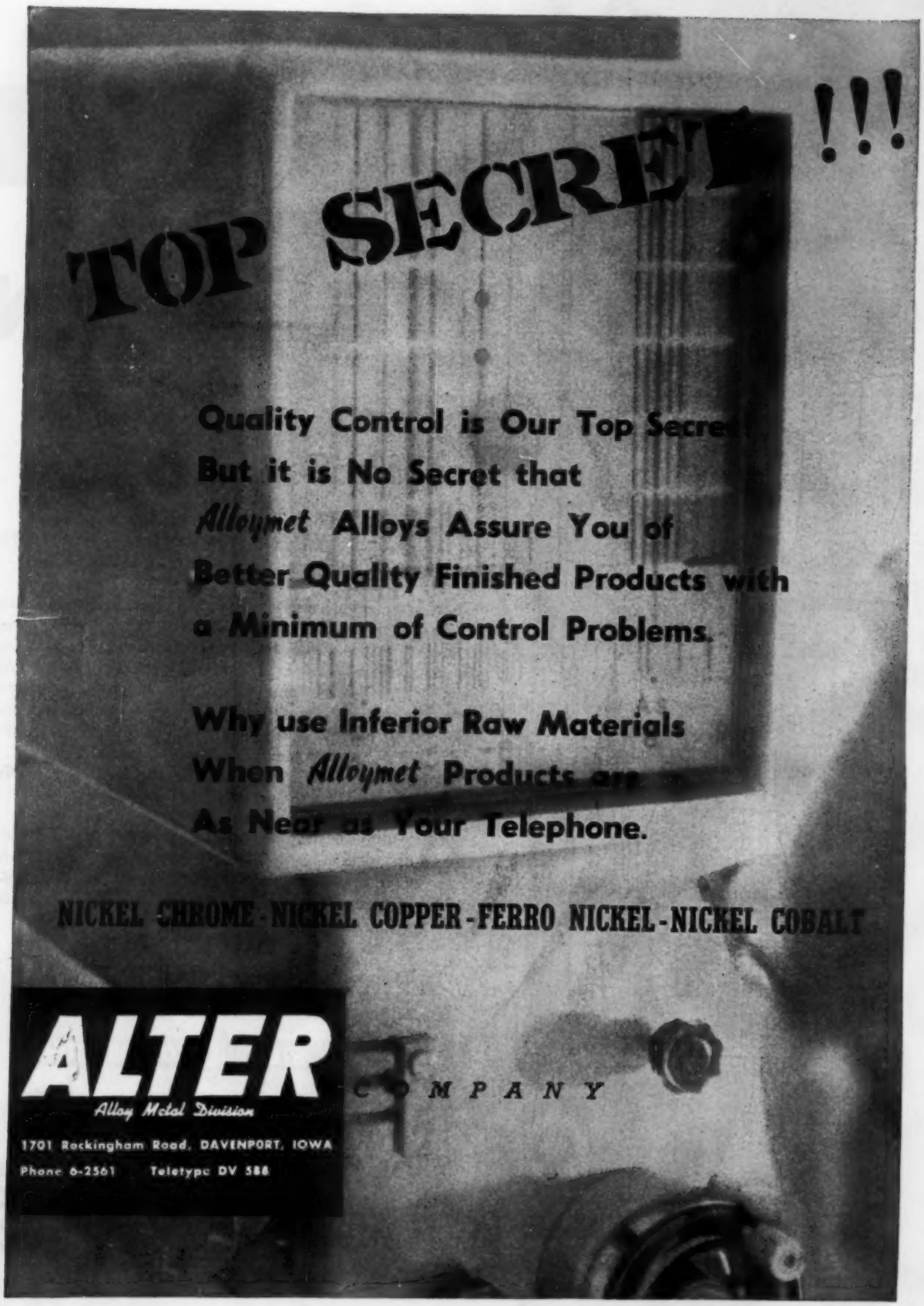
Weirton, West Virginia

NATIONAL STEEL CORPORATION



The photomicrograph on the left illustrates Weirton high carbon strip that has been spheroidized and annealed—soft and ductile—ideal for cold-forming operations. The one on the right shows the pearlitic steel structure, temper-rolled in controlled hardness and strength for clean, economical blanking procedure.

WEIRTON STEEL COMPANY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STEEL

January 23, 1956

Market Outlook

CUTBACKS in automotive requirements are beginning to be felt by steelmakers. At least one producer has shifted some sheet tonnage from one of its mills to another. In general, producers exhibit no great concern. Few, if any, outright tonnage cancellations have been received. At worst, shipments are being deferred, and relatively small tonnage is involved.

Widespread publicity given auto cutbacks is prompting a flood of calls to mills from other consumers who want the auto steel being released. Requests come from appliance manufacturers, furniture makers, railroads, car shops and virtually every segment of the metal fabricating industry.

EXECUTIVE OPINION—"It's my analysis," says a sales executive of one large steel producer, "there is no crack in the heart of sheet sales. There is some falling off around the fringes. We have cutbacks in long ternes for gas tanks, and a small percentage of cold-rolled sheet orders have been moved back. But all the steel cut back will be needed."

This steelman points out that other consuming lines are begging for tonnage. They haven't had a chance to build inventories.

RUSH TO BUY—The slight slowdown in auto production doesn't mean automotive demand is drying up. Most business observers still are confident this will be a fairly good year for automobiles even though car output will be under last year's record. In any case, steel requirements for railroad cars, roads, public building, etc., are bound to provide a cushion.

Buying for inventory is bound to sustain pressure on the mills through the first half, especially with a possible steel strike at midyear motivating protective coverage. That's why reported slowing down in auto needs is giving rise to a rush of requests from other customers, asking: How soon will more steel be available? The answer, invariably, is tonnage won't be much freer until around midyear.

SECOND QUARTER—Some of the mills are booking second quarter tonnage. Allotments are on the same basis as in the first quarter, though they may be upped later. Producers will be in the best position on commitments in almost a year by the time the quarter opens.

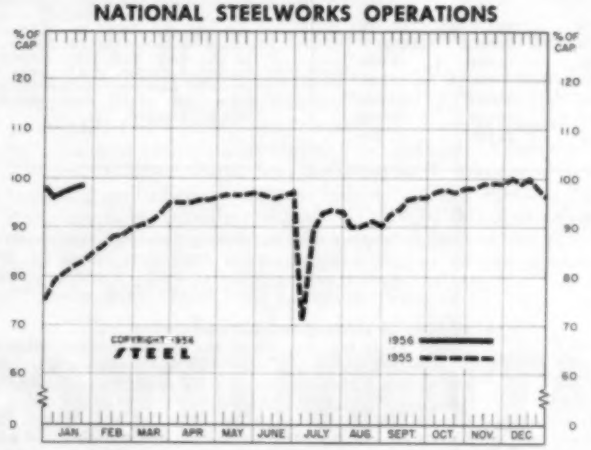
This improvement in arrearages is due to blanking out first quarter tonnage to care for last quarter's overflow. The mills' restraint in booking new business also has been a factor.

PRICES FIRM—Pricewise, the steel market is firm. Some revisions in extras continue to be made, notably in the bar category. One producer effected changes in various stainless steel extras and prices. Talk is heard of a possible increase in pig iron. Generally, a steel price increase is expected at midyear, but some upward revisions are likely even before then. Currently, market speculation is directed to a proposed 7-per-cent freight rate increase to go into effect Feb. 25.

STEEL's price composite on finished steel is unchanged at $128.

PRODUCTION—Steel mills increased ingot operations ½-point last week to 98.5 per cent of capacity. For two weeks output has been at an all-time high of 2,428,000 net tons weekly.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

(Percentage of Capacity Engaged)

	Week Ended Jan. 22	Change	Same Week 1955	Same Week 1954
Pittsburgh	99	— 3*	80	83.5
Chicago	98	— 0.5*	86	81
Mid-Atlantic	97	0*	77	82
Youngstown	100	+ 2	88	70
Wheeling	97.5	0	95.5	81
Cleveland	101	+ 5*	87	83
Buffalo	105	0	100	71
Birmingham	96.5	+ 1	74	87
New England	94	0	78	60
Cincinnati	88	+ 1.5	81.5	69.5
St. Louis	99	— 0.5	87.5	65
Detroit	104	— 1	89	89
Western	106	+ 3	84	80
National Rate	98.5	+ 0.5	83	74

INGOT PRODUCTION‡

	Week Ended Jan. 22	Week Ago	Month Ago	Year Ago
INDEX (1947-1949=100)	148.8†	151.1	145.5	125.0
NET TONS (In thousands)	2,391†	2,428	2,338	2,008

*Change from preceding week's revised rate. †Estimated. ‡Amer. Iron & Steel Institute. Weekly capacity (net tons): 2,461,893 in 1956; 2,413,278 in 1955; 2,384,549 in 1954

Metalworking Outlook—p. 33

Technical Outlook—p. 69

Price Indexes and Composites

FINISHED STEEL PRICE INDEX (Bureau of Labor Statistics)

	Jan. 17 1956	Jan. 10 1956	Month Ago	Dec. Average
(1947-1949=100)	155.8	155.8	155.3	154.7

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Jan. 17

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parenthesis. For complete description of the following products and extras and deductions applicable to them write to STEEL.

Rails, Standard, No. 1	$4.800	Sheets, Electrical	$10.175
Rails, Light, 40 lb	6.217	Strip, C.R., Carbon	8.293
Tie Plates	5.625	Strip, C.R., Stainless, 403 (lb)	0.444
Axles, Railway	8.000	Strip, H.R., Carbon	5.456
Wheels, Freight Car, 33 in. (per wheel)	52.50	Pipe, Black, Buttweld (100 ft)	16.997
Plates, Carbon	4.950	Pipe, Galv., Buttweld (100 ft)	21.137
Structural Shapes	4.867	Pipe, Line (100 ft)	167.167
Bars, Tool Steel, Carbon (lb)	0.480	Casing, Oil Well, Carbon (100 ft)	165.129
Bars, Tool Steel, Oil Hardening Die (lb)	0.560	Casing, Oil Well, Alloy (100 ft)	244.670
Bars, Tool Steel, H.R., Alloy, High Speed W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.60 (lb)	1.185	Tubes, Boiler (100 ft)	39.470
Bars, Tool Steel, H.R., Alloy, High Speed W-18, Cr 4 V 1 (lb)	1.688	Tubing, Mechanical, Carbon	20.980
Bars, H.R., Alloy	9.425	Tubing, Mechanical, Stainless, 304 (100 ft)	178.897
Bars, H.R., Stainless, 303 (lb)	0.450	Tin Plate, Hot-dipped, 1.25 lb	8.933
Bars, H.R., Carbon	5.50	Tin Plate, Electrolytic, 0.25 lb	7.633
Bars, Reinforcing	5.313	Black Plate, Canmaking Quality	6.733
Bars, C.F., Carbon	8.770	Wire, Drawn, Carbon	8.575
Bars, C.F., Alloy	12.200	Wire, Drawn, Stainless 430 (lb)	0.578
Bars, C.F., Stainless, 302 (lb)	0.469	Bale ties (bundle)	6.473
Sheets, H.R., Carbon	5.145	Nails, Wire, 8d Common	8.595
Sheets, C.R., Carbon	6.214	Wire, Barbed (80-rod spool)	7.847
Sheets, Galvanized	7.770	Woven Wire Fence (20-rod roll)	18.635
Sheets, C.R., Stainless, 302 (lb)	0.588		

STEEL's FINISHED STEEL PRICE INDEX*

	Jan. 18 1956	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Index (1935-39 av.=100)	209.10	209.10	208.90	194.53	171.92
Index in cents per lb	5.665	5.665	5.659	5.270	4.657

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT*	$128.00	$128.00	$127.68	$117.82	$105.55
No. 2 Fdry, Pig Iron, GT	58.99	58.99	58.99	56.54	52.54
Basic Pig Iron, GT	58.49	58.49	58.49	56.04	52.16
Malleable Pig Iron, GT	59.77	59.77	59.77	57.27	53.27
Steelmaking Scrap, GT	53.33	53.33	50.67	35.00	46.33

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 84; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.
†Revised.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Jan. 18 1956	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh	4.65	4.65	4.65	4.30	3.70
Bars, H.R., Chicago	4.65	4.65	4.65	4.30	3.70
Bars, H.R., deld. Philadelphia	4.90	4.90	4.90	4.55	4.15
Bars, C.F., Pittsburgh	5.90	5.90	5.90	5.40	4.85
Shapes, Std., Pittsburgh	4.60	4.60	4.60	4.25	3.65
Shapes, Std., Chicago	4.60	4.60	4.60	4.25	3.65
Shapes, deld., Philadelphia	4.85	4.85	4.85	4.53	3.90
Plates, Pittsburgh	4.50	4.50	4.50	4.225	3.70
Plates, Chicago	4.50	4.50	4.50	4.225	3.70
Plates, Coatesville, Pa.	4.80	4.80	4.80	4.225	4.15
Plates, Sparrows Point, Md.	4.50	4.50	4.50	4.225	3.70
Plates, Claymont, Del.	4.80	4.80	4.80	4.225	4.15
Sheets, H.R., Pittsburgh	4.325	4.325	4.325	4.05	3.60-3.75
Sheets, H.R., Chicago	4.325	4.325	4.325	4.05	3.60
Sheets, C.R., Pittsburgh	5.325	5.325	5.325	4.95	4.35
Sheets, C.R., Chicago	5.325	5.325	5.325	4.95	4.35
Sheets, C.R., Detroit	5.325-5.425	5.325-5.425	5.325-5.425	5.10	4.55
Sheets, Galv., Pittsburgh	5.85	5.85	5.85	5.45	4.80
Strip, H.R., Pittsburgh	4.325	4.325	4.325	4.05	3.75-4.00
Strip, H.R., Chicago	4.325	4.325	4.325	4.05	3.50
Strip, C.R., Pittsburgh	6.25	6.25	6.25	5.75	4.65-5.35
Strip, C.R., Chicago	6.25-6.35	6.25-6.35	6.35	5.85	4.90
Strip, C.R., Detroit	6.35	6.35	6.35	5.90	4.35-5.60
Wire, Basic, Pittsburgh	6.60	6.60	6.25	5.75	4.85-5.10
Nails, Wire, Pittsburgh	7.60	7.60	7.60	6.85	5.90-6.20
Tin plate (1.50 lb), box, Pitts.	$9.45	$9.45	$9.45	$9.05	$8.70
SEMIFINISHED STEEL					
Billets, Forging, Pitts. (NT)	$84.50	$84.50	$84.50	$78.00	$66.00
Wire rods, $\frac{1}{4}$-$\frac{9}{16}$" Pitts.	5.025	5.025	5.025	4.675	4.10-4.30
PIG IRON, Gross Ton					
Bessemer, Pitts.	$59.50	$59.50	$59.50	$57.00	$53.00
Basic, Valley	58.50	58.50	58.50	56.00	52.00
Basic, deld. Phila.	62.16	62.16	62.16	59.66	56.39
No. 2 Fdry, Pitts.	59.00	59.00	59.00	56.50	52.50
No. 2 Fdry, Chicago	59.00	59.00	59.00	56.50	52.50
No. 2 Fdry, Valley	59.00	59.00	59.00	56.50	52.50
No. 2 Fdry, deld. Phila.	62.66	62.66	62.66	55.16	56.89
No. 2 Fdry, Birm.	55.00	55.00	55.00	52.88	48.88
No. 2 Fdry (Birm.) deld. Cin.	62.70	62.70	62.70	60.58	55.58
Malleable, Valley	59.00	59.00	59.66	56.50	52.50
Malleable, Chicago	59.00	59.00	59.00	56.50	52.50
Ferromanganese, Duquesne	205.00†	205.00†	190.00†	190.00†	188.00*

†74-76% Mn, net ton. *75-82% Mn, gross ton, Etna, Pa.

SCRAP, Gross Ton (Including broker's commission)

No. 1 Heavy Melt, Pitts.	$54.50	$54.50	$50.50	$36.50	$46.50
No. 1 Heavy Melt, E. Pa.	55.00	55.00	52.00	33.50	47.50
No. 1 Heavy Melt, Chicago	50.50	50.50	49.50	35.00	45.00
No. 1 Heavy Melt, Valley	58.50	58.50	52.50	36.50	46.25
No. 1 Heavy Melt, Cleve.	54.50	54.50	51.50	33.50	45.75
No. 1 Heavy Melt, Buffalo	47.50	47.50	45.50	30.50	44.88
Rails, Rerolling, Chicago	72.50	72.50	71.00	53.00	67.00
No. 1 Cast, Chicago	51.50	51.50	50.50	40.00	62.00
COKE, Net Ton					
Beehive, Furn, Connlsvl.	$14.125	$14.125	$14.125	$13.75	$14.75
Beehive, Fdry, Connlsvl.	16.50	16.50	16.50	16.75	17.50
Oven, Fdry, Chicago	27.00	27.00	25.75	24.50	21.00

Daily Nonferrous Price Record

	Price Jan. 18	Last Change		Previous Price	Dec. Avg.	Nov. Avg.	Jan. 1955 Avg.
Copper	43.00-50.25	Dec.	29, 1955	43.00-50.00	46.053	44.420	30.180
Lead	15.80	Jan.	13, 1956	16.30	15.358	15.300	14.800
Zinc	13.50	Jan.	6, 1956	13.00	13.000	13.000	11.500
Tin	104.75	Jan.	18, 1956	104.50	107.98	97.825	87.280
Nickel	64.50	Nov.	24, 1954	60.00	64.500	64.500	64.500
Aluminum	24.40	Aug.	8, 1955	23.20-24.40	24.400	24.400	22.900
Magnesium	32.50	Aug.	16, 1955	28.50	32.500	32.500	27.000

Quotations in cents per pound based on: COPPER, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary ingots, 99 + %, deld.; MAGNESIUM, 99.8%, Freeport, Tex.

What You Can Use the Markets Section for:

- **A source of price information.**
  Current prices are reported each week. Price changes are shown in italics. Price trends are shown in tables of indexes and comparisons.
- **A directory of producing points.**
  Want to know who makes something, or where it is made? The steel price tables alphabetically list the cities of production and indicate the producing company. If you are a buyer, you may want to make a map showing comparative distances of sources of supply and to help you compute freight costs. If you are a seller of supplies you can make a map to spot your sales possibilities.
- **A source of price data for making your own comparisons.**
  Maybe you want to keep a continuous record of price spread between various forms of steel. You can get your base price information from STEEL's price tables.
- **A source of information on market trends.**
  Newsy items tell you about the supply-demand situation of materials, including iron and steel, nonferrous metals and scrap. Other articles analyze special situations of interest and importance to you.
- **Reports on iron and steel production, and materials and product shipments.**

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Nonferrous Metals

After chalking up the best year in its history, the aluminum industry sets out to better its mark in '56. Announced and existing facilities will bring capacity to 4.3 billion lb

Nonferrous Metal Prices, Pages 106 & 107

THE ALUMINUM industry registered seven record months in 1955 (see table). In any other year, nine of last year's monthly totals would have set records. The final tally: 3,131,568,878 lb were produced in the U. S. last year. This compares with 2.9 billion lb in 1954.

New Goals—Another record smashing year is on the books, says the aluminum industry. R. S. Reynolds Jr., president, Reynolds Metals Co., reports: "Announced expansion plans of all present and prospective producers will add a total of 1.4 billion lb of new capacity during the next few years. This is about a 46-percent increase over 1955 capacity." Kaiser Aluminum & Chemical Corp. says that its intensive field surveys indicate that "total prospective aluminum consumption will be more than 8 billion lb per year by 1965."

Aluminum advocates are quick to point out that all expansions are being based on the premise of increased peacetime markets, not military requirements. And existing producers are depending entirely on private financing to meet capital requirements.

Total existing and announced capacity (by companies) shows: Alcoa, 1.6 billion lb; Kaiser, 1.3 billion lb; Reynolds, 1.1 billion; Anaconda, 120 million lb; Olin-Mathieson, 120 million lb; Harvey, 108 million lb. Total: 4.3 billion lb.

Lead Prices Vacillate

Lead doesn't bounce, but its prices do. The metalworking industry was surprised again as lead dropped from 16.50 cents a pound (New York) to 16. Reasons: 1. The London market quotation dropped. 2. Scrap became more plentiful. 3. Demand took a nose dive. The rise to 16.50 cents a pound was deemed necessary on Jan. 4 to prevent Mexican lead from going into the foreign market. Then the London Metal Exchange quotation, which was equivalent to 15.75 cents a pound on Jan. 4, began to drop. When it reached the 14.50-cent-a-pound level in London, American producers looked at dwindling market demands and dropped the price. Department of second guessing: Did lead producers know from the beginning that their price hike to 16.50 cents a pound (the second in a few days) would not hold, but would force LME to reduce its price?

Copper Production Rises

World refined production of copper during 1955 reached 2,728,219 tons. This compares with 2,466,547 tons during 1954. Domestic production reached 1,467,488 tons, a daily average of 3945 tons. Even with all the labor inharmony during the year, domestic refined production established a new record. World refined production will reach some 3 million tons this year. Outlook: It may be the second half before the copper price starts a gradual decline from its current peak of 43 cents a pound for primary, 50-50.25 cents a pound for custom smelted.

The Office of Defense Mobilization has authorized the release of 4.2 million lb of government-owned copper. It will go to private firms in California, Oregon and Nevada which were hit by floods. Applications must be made to the Commerce department. Purchases will be made through the General Services Administration. ODM Director Arthur S. Flemming explains that the red metal will come from Defense Production Act inventories, not from the national defense stockpile. Defense stockpile copper can be released only (in times of peace) by the President.

Aluminum Records Set in '55

(in pounds)

Dec.	**281,496,030**
Nov.	**267,377,623**
Oct.	**269,312,211**
Sept.	**261,211,002**
Aug.	**267,101,817**
July	**265,337,163**
June	**255,265,003**
May	**262,256,336**
Apr.	**252,788,467**
Mar.	**260,543,479**
Feb.	**232,472,999**
Jan.	**256,406,748**

Boldface indicates new monthly records
Source: Aluminum Association

Nicaro: Politics Boom

It's an election year, and nickel is getting its share of political investigations early. Question in doubt so far as the House Government Activities subcommittee is concerned: How was the insurance broker picked for the government's expansion program ($43 million) at its Nicaro nickel mines? Chairman Jack Brooks (Dem., Tex.) is screaming political maneuvering, while GSA Administrator Edmund F. Mansure contends: "The government insurance business should go to persons friendly to the party (Republican)." Mr. Mansure denies that he recommended a specific firm.

Behind the scenes, most observers feel that current investigations will not hinder expansion under way at Nicaro. Rumor No. 1 of the week: There are indications that the government will not open up smelting and refining facilities in Cuba. Instead, experiments are being conducted with a process for getting nickel metal directly from nickel oxide. This would mean that Nicaro could produce nickel ingot by the end of this year if the process is ready and the government is willing to approve the project in the near future. Rumor No. 2: Bids have already been put out and one accepted for the custom smelting of Nicaro nickel. It will be done, says the rumor, in Philadelphia by electric furnaces.

Market Memos

- Western Copper Mills Ltd., a newly formed company, will construct a copper mill in the greater Vancouver area. The mill (cost: $3.5 million) will produce seamless copper tubing and pipes, bus bars, copper wire, rods and round stock. It will be completed this year.
- If you are going to export certain aluminum and copper materials, be sure to submit an application before Mar. 16 so you will be considered for first-quarter licensing, says the Bureau of Foreign Commerce. The cutoff date applies to these commodities: New and old aluminum scrap; aluminum remelt ingots; new and old copper scrap; new and old copper-base alloy scrap containing 40 per cent or more copper; and copper-base alloy ingots and other crude forms.
- Handy & Harman's annual review of the silver market shows: 1. World demand will continue near its present high levels. 2. There will be little change in available supplies.

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Nonferrous Metals

Cents per pound, carlots, except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99 + %, ingots 24.40, pigs 22.50. 10,000 lb or more, f.o.b. shipping point. Freight allowed on 500 lb or more.

Aluminum Alloy: No. 13, 12% Si, 26.20; No. 43, 5% Si, 26.00; No. 142, 4% Cu, 1.5% Mg, 2% Ni, 28.20; No. 195, 4.5% Cu, 0.8% Si, 27.60; No. 214, 3.8% Mg, 27.80; No. 356, 7% Si, 0.3% Mg, 26.20.

Antimony: R.M.M. brand, 99.5%, 33.00, Lone Star brand, 33.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 27.00-28.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97%, lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $72.75 per lb of contained Be, f.o.b. Reading, Pa., Elmore, O.

Beryllium Copper: 3.75-4.25% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. Reading, Pa. or Elmore, O.

Bismuth: $2.25 per lb ton lots.

Cadmium: Sticks and bars $1.70 per lb, deld.

Cobalt: 97-99%, $2.60 per lb for 550-lb keg; $2.62 per lb for 100-lb case; $2.67 per lb under 100 lb.

Columbium: Powder, $119.20 per lb, nom.

Copper: Electrolytic, 43.00 deld. Conn. Valley; 43.00 deld. Midwest; customer smelters, 50.00-50.25 deld.; Lake, 43.00 deld.; Fire refined, 42.75 deld.

Germanium: First reduction, $201.85-$220 per lb; intrinsic grade, $220-$242.67 per lb, depending on quantity.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $100-$120 nom, per troy oz.

Lead: Common, 15.80, chemical, 15.90, corroding, 15.90, St. Louis, New York basis, add 0.20.

Lithium: 99% +, cups or ingots, $11.50; rod $13.50; shot or wire, $14.50, f.o.b. Minneapolis, 100 lb lots.

Magnesium: 99.8% self-palletizing pig, 32.50; notched ingot, 32.25, 10,000 lb or more, f.o.b. Freeport, Tex. For Port Newark, N. J., add 1.40 for pig and 1.45 for ingot; for Madison, Ill., add 1.20 for pig and 1.25 for ingot; for Los Angeles, add 2.00 for both pig and ingot. Sticks 1.3 in. diameter, 53.00, 100 to 4999 lb, f.o.b. Madison, Ill.

Magnesium Alloys: AZ91C and alloys C, G, H and R, 36.00; alloy M, 38.00, 10,000 lb or more, f.o.b. Freeport, Tex. For Port Newark, N. J., add 1.40; for Madison, Ill., add 0.50; for Los Angeles, add 2.50, AZ91B, 31.00, Madison, Ill.

Mercury: Open market, spot, New York, $279-$281 per 76-lb flask.

Molybdenum: Powder 99% hydrogen reduced, $3-$3.35 per lb; pressed ingot, $4.06 per lb; sintered ingot, $5.53 per lb.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 64.50; 10-lb pigs, unpacked, 67.65; "XX" nickel shot, 69.00; "F" nickel shot or ingots for addition to cast iron, 64.50; prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 0.92.

Osmium: $80-$100, nom, per troy oz.

Palladium: $22-$24 per troy oz.

Platinum: $97-$117 per troy oz from refineries.

Radium: $16-$21.50 per mg radium content, depending on quantity.

Rhodium: $118-$125 per troy oz.

Ruthenium: $45-$55 per troy oz.

Selenium: 99.5%, $9-$10 per lb.

Silver: Open market, 90.50 per troy oz.

Sodium: 16.50, c.l.; 17.00 l.c.l.

Tantalum: Sheet, rod, $68.70 per lb; powder, $56.63 per lb.

Tellurium: $1.75 per lb.

Thallium: $12.50 per lb.

Tin: Straits, N. Y., spot, 105; prompt, 104.75.

Titanium: Sponge, 99.3+%, grade A-1 ductile (0.3% Fe max), $3.45, grade A-2 (0.5% Fe max), $3.15 per pound.

Tungsten: Powder, 98.8%, carbon reduced. 1000-lb lots, $4.30 per lb, nom., f.o.b. shipping point; less than 1000 lb add 15.00; 99 + % hydrogen reduced $4.85. Treated ingot, $6.70.

Zinc: Prime Western, 13.50; brass special, 13.75; intermediate, 14.00, East St. Louis, freight allowed over 0.50 per pound. High grade, 14.85; special high grade 15.25, deld. Diecasting alloy ingot No. 3, 18.00; No. 2, 19.00; No. 5, 18.50, deld.

Zirconium: Ingots, commercial grade, $14.40 per lb; low-hafnium reactor grade, $23.07. Sponge, commercial grade, $7.50-$10.60 per lb, depending on quantity; reactor grade, $14.00-$22.00 per lb, depending on quantity. Powder, electronics grade, $15 per lb; flash grade, $11.50.

(Note: Chromium, manganese and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 32.50-34.25; No. 12 foundry alloy (No. 2 grade) 31.50-31.75; 5% silicon alloy, 0.60 Cu max, 33.00-33.25; 13 alloy, 0.60 Cu max, 33.00-33.25; 195 alloy, 33.00-33.25; 108 alloy 31.50. Steel deoxidizing grades notch bars, granulated or shot: Grade 1, 32.00-32.75; grade 2, 31.25-31.75; grade 3, 30.75-31.00; grade 4, 30.00-30.25.

Brass Ingot: Red brass No. 115, 42.00; tin bronze No. 225, 56.00; No. 245, 48.75; high-leaded tin bronze No. 305, 45.75; No. 1 yellow No. 405, 33.25; manganese bronze No. 421, 37.75.

Magnesium Alloy Ingot: AZ63A, 34.00; AZ91B, 34.00; AZ91C, 34.00; AZ92A, 34.00.

NONFERROUS MILL PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb, f.o.b. Temple, Pa.; nominal 1.9% Be alloy) Strip, $1.84; rod, bar, wire, $1.81.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 100,000-lb lots, 48.35; 30,000-lb lots 48.88; l.c.l., 48.98. Weatherproof, 100,000-lb lots, 46.03; 30,000-lb lots, 46.28; l.c.l. 46.78. Magnetic wire deld., 15,000 lb or more, 55.52; l.c.l., 56.27.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets, full rolls, 140 sq ft or more, $21.50 per cwt; pipe, full coils, $21.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill) Sheets, $13.10-$13.60; sheared mill plate, $10.50-$12.00; strip, $13.10-$13.60; wire, $9.50-$11.50; forging billets, $7.90-$8.15; hot-rolled and forged bars, $7.90-$8.15.

ZINC

(Prices per lb, c.l., f.o.b. mill) Sheets, 23.00-24.00; ribbon zinc in coils, 20.50-21.50; plates, 20.00-22.25.

ZIRCONIUM

Plate, $22; H.R. strip, $19; C.R. strip, $29; forged or H.R. bars, $17; wire, 0.015 in., 1.00c per linear foot.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	102	83	99
Strip, C.R.	102	92	125
Plate, H.R.	97	87	95
Rod, Shapes, H.R.	87	74	93
Seamless Tubes	122	110	153
Shot, Blocks	...	71	...

ALUMINUM

Screw Machine Stock: 30,000 lb base.

Diam. (in.) or across flats	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
Drawn				
0.125	67.9	66.4	...	...
0.156-0.172	57.5	55.9	...	...
0.188	57.5	55.9	...	71.7
0.219-0.234	54.5	52.9	...	...
0.250-0.281	54.5	52.9	...	68.4
0.313	54.5	52.9	...	65.2
Cold-finished				
0.375-0.547	53.4	51.4	63.7	61.3
0.563-0.688	53.4	51.4	60.6	57.5
0.750-1.000	52.1	50.1	55.4	54.2
1.063	52.1	50.1	...	52.3
1.125-1.500	50.1	48.2	53.6	52.3
Rolled				
1.563	48.8	46.9	...	...
1.625-2.000	48.2	46.2	...	50.5
2.125-2.500	47.0	45.0	...	...
2.563-3.375	45.6	43.6	...	...

ALUMINUM

Sheet and Circles: 1100 and 3003 mill finish (30,000 lb base; freight allowed)

Thickness Range Inches	Flat Sheet	Flat Sheet Circles*	Coiled Sheet	Coiled Sheet Circle†
0.249-0.136	37.5	42.3	...	...
0.135-0.096	38.0	43.2	...	...
0.095-0.077	38.7	44.2	36.1	41.3
0.076-0.061	39.3	45.1	36.3	41.5
0.060-0.048	39.9	45.6	36.7	42.0
0.047-0.038	40.4	46.5	37.2	42.4
0.037-0.030	40.8	47.0	37.6	43.1
0.029-0.024	41.4	47.5	37.9	43.6
0.023-0.019	42.2	49.0	38.8	44.5
0.018-0.017	43.0	...	39.4	45.4
0.016-0.015	43.9	...	40.2	46.6
0.014	44.9	...	41.2	47.9
0.013-0.012	46.1	...	41.9	48.9
0.011	47.1	...	43.1	50.5
0.010-0.0095	48.4	...	44.3	52.2
0.009-0.0085	49.7	...	45.8	54.3
0.008-0.0075	51.3	...	47.0	56.1
0.007	52.8	...	48.5	58.4
0.006	54.4	...	49.9	63.4

*48 in. max diam. †26 in. max diam.

ALUMINUM

Plates and Circles: Thickness 0.250-3 in., 24-60 in. width or diam, 72-240 in. lengths.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	36.5	40.8
5050-F	37.6	41.9
3004-F	38.6	43.8
5052-F	39.9	45.2
6061-T6	41.1	46.0
2024-T4*	43.6	49.9
7075-T6*	51.4	58.5

*24-48 in. widths or diam, 72-180 lengths.

ALUMINUM

Forging Stock: Round, Class 1, 39.10-50.10 in specific lengths 36-144 in., diameters 0.375-8 in. Rectangles and squares, Class 1, 43.00-56.20 in random lengths, 0.375-4 in. thick, widths 0.750-10 in.

Pipe: ASA Schedule 40, alloy 6063-T6, 20-ft lengths, plain ends, 90,000-lb base, per 100 ft.

Nom. Pipe Size (in.)		Nom. Pipe Size (in.)	
¾	$16.85	2	$ 51.95
1	26.50	4	143.00
1¼	35.85	6	256.70
1½	42.90	8	386.30

MAGNESIUM

Sheet: AZ31, commercial grade, 0.032 in., 99.00; 0.064 in., 78.00; 0.125 in., 63.50, 30,000 lb and over, f.o.b. mill.

Plate: AZ31, 61.00, 30,000 lb or more, 0.250 in. and over, widths 24-60 in., lengths 72-180 in., tread plate, 64.00, 30,000 lb or more, ¼-in. thick, widths 24-60 in., lengths 60-192 in.; tooling plate 66.00, 30,000 lb or more, 0.250-3.000 in., widths 60-72 in., lengths 72-180 in.

Extrusions: AZ31 commercial grade, rectangles, ¼ x 2 in., 64.70; 1 x 4 in., 69.50. Rod, 1 in., 61.50; 2 in., 59.00. Tubing, 1 in. OD x 0.065 in., 82.50. Angles, 1 x 1 x ⅛-in., 68.40; 2 x 2 x ⅛-in., 62.50. Channels, 5 in., 63.40. I-beams, 5 in., 62.70.

NONFERROUS SCRAP

DEALERS BUYING PRICES

(Cents per pound, New York, in ton lots)

Aluminum: 1100 clippings, 21.00-21.50; old sheets 17.50-18.00; borings and turnings, 11.50-12.00; crankcases, 17.50-18.00; industrial castings 17.50-18.00.

Copper and Brass: No. 1 heavy copper and wire, 41.00-41.50; No. 2 heavy copper and wire, 37.00-37.50; light copper, 35.00-35.50; No. 1 composition red brass, 32.50-33.00; No. 1 composition turnings, 31.50-32.00; yellow

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES f		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tube	Clean Heavy	Rod Ends	Clean Turnings
Copper	63.13b	60.36c	....	63.32	39.000	39.000	38.250
Yellow Brass	52.27	42.41d	52.81	55.18	28.875	28.625	26.750
Red Brass, 85%	58.09	58.03	58.63	60.90	34.250	34.000	33.500
Low Brass, 80%	56.55	56.49	57.09	59.36	32.750	32.500	32.000
Naval Brass	55.63	49.94	62.69	58.79	26.750	26.500	26.000
Com. Bronze, 90%	60.18	60.12	60.72	62.74	35.750	35.500	35.000
Nickel Silver, 10%	66.09	66.33g	66.33	....	32.500	32.250	16.250
Phos. Bronze, A, 5%	80.99	81.49	81.49	82.67	39.250	39.000	38.000
Silicon Bronze	66.54	65.73	66.58	68.68e	37.875	37.625	37.875
Manganese Bronze	59.37	53.38	63.82	....	27.000	26.750	26.000
Muntz Metal	53.74	49.55	....	....	27.000	26.750	26.250

a. Cents per lb, f.o.b. mill; freight allowed on 500 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. 3% silicon. f. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb. g. Leaded.

brass turnings, 16.50-17.00; new brass clippings, 27.50-28.00; light brass, 19.00-19.50; heavy yellow brass, 22.50-23.00; new brass rod ends, 26.00-26.50; auto radiators, unsweated, 25.00-25.50; cocks and faucets, 25.00-25.50 brass pipe 25.00-25.50.

Lead: Heavy, 12.75-13.25; battery plates, 7.00-7.25; linotype and stereotype, 14.00-14.25; electrotype, 13.25-13.75; mixed babbitt, 15.50.

Magnesium: Clippings, 18.50-19.50; clean castings, 18.00-19.00; iron castings, not over 10% removable Fe, less full deduction for Fe, 16.00-17.00.

Monel: Clippings, 60.00-65.00; old sheets, 55.00-65.00; turnings, 50.00; rods, 59.50-65.00.

Nickel: Sheets and clips, 100.00-150.00; rolled anodes, 100.00-150.00; turnings, 85.00-125.00; rod ends, 100.00-150.00.

Zinc: Old zinc, 6.00-6.50; new die-cast scrap, 6.00; old die-cast scrap, 3.50.

REFINER'S BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Aluminum: 1100 clippings, 24.00; 3003 clippings, 23.75-24.00; 6151 clippings, 23.00-24.00; 5052 clippings, 23.50-24.00; 2014 clippings, 23.00-23.50; 2017 clippings, 23.00-23.50; 2024 clippings, 23.00-23.50; mixed clippings, 23.00-23.50; old sheet, 19.00-21.00; old cast, 20.00-21.00; clean old cable (free of steel), 24.00; borings and turnings, 21.00-22.00.

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 65.00; light scrap, 60.00; turnings and borings, 43.00-55.00.

Copper and Brass: No. 1 heavy copper and wire, 41.50; No. 2 heavy copper and wire, 40.00; light copper 37.75; refinery brass (60% copper) per dry copper content, 38.00.

INGOTMAKERS' BUYING PRICES

(Cents per pound, carlots, delivered)

Copper and Brass: No. 1 heavy copper and wire, 41.50; No. 2 heavy copper and wire, 40.00; light copper, 37.75; No. 1 composition borings, 33.50; No. 1 composition solids, 34.50; heavy yellow brass solids, 23.50; yellow brass turnings, 22.50; radiators, 26.50.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.70 per lb.

Copper: Flat-rolled, 59.79, oval, 58.92, 5000-10,000 lb; electrodeposited, 54.28, 2000-5000 lb lots; cast 59.54, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, $1.015; 100-499 lb, 99.50; 500-4999 lb, 95.50; 5000-29,999 lb, 93.50; 30,000 lb, 91.50. Carbonized, deduct 3 cents a lb. All prices eastern delivery effective Jan. 1, 1955.

Tin: Bar or slab, less than 200 lb, $1.235; 200-499 lb, $1.220; 500-999 lb, $1.215; 1000 lb or more, $1.210.

Zinc: Balls, 21.00; flat tops, 21.00; flats, 22.75; ovals, 22.00, ton lots.

CHEMICALS

Cadmium Oxide: $2.15 per lb, in 100-lb drums.

Chromic Acid: Less than 10,000 lb, 28.50; over 10,000 lb, 27.50.

Copper Cyanide: 100 lb, 85.25; 200 lb, 84.50; 300 lb, 84.25; 400-900 lb, 85.50; 1000 lb, 81.50.

Copper Sulphate: 500-1900 lb, 17.90; 2000-5900 lb, 15.90; 6000 lb or more, 15.65.

Nickel Chloride: 100 lb, 46.50; 200 lb, 44.50; 300 lb, 35.25; 400-4900 lb, 33.25; 5000-35,900 lb, 39.50; 10,000 lb and over, 38.50. All prices eastern delivery, effective Jan. 1, 1955.

Nickel Sulphate: 100 lb, 38.25; 200 lb, 36.25; 3300 lb, 35.25; 400-4900 lb, 33.25; 5000-35,900 lb, 31.25; 36,000 lb, 30.25. All prices eastern delivery, effective Jan. 1, 1955.

Silver Cyanide: (Cents per ounce) 4-oz bottle, 86.875; 16-oz bottle, 85.625; 80-oz bottle, 83.125; 100-oz bottle, 83.125; f.o.b. St. Louis, New York and Los Angeles. Effective Sept. 30, 1955.

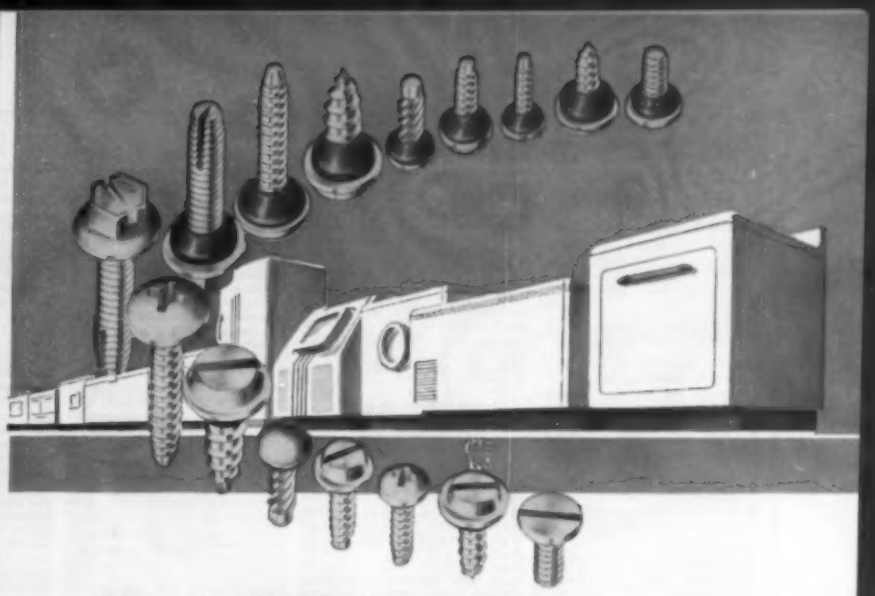
Sodium Stannate: Less than 100 lb, 73.80; 100-600 lb, 65.20; 700-1900 lb, 62.70; 2000-9900 lb, 61.00; 10,000 lb or more, 59.80.

Stannous Chloride (anhydrous): Less than 25 lb, $1.714; 25 lb, $1.364; 100 lb, $1.214; 400 lb, $1.190; 5200-19,600 lb, $1.068; 20,000 lb or more, 94.60.

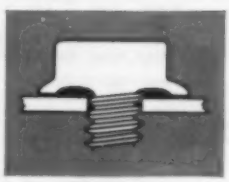
Stannous Sulphate: Less than 50 lb, $1.339; 50 lb, $1.039; 100-1900 lb, $1.019; 2000 lb or more, 99.90.

Stannous Sulphate: Less than 50 lb, $1.351; 50 lb, $1.051; 100-1900 lb, $1.031; 2000 lb or more, $1.011.

Zinc Cyanide: Under 1000 lb, 54.30; 1000 lb and over, 52.30.



New Tuff-Tite* Fastener Is Leakproof—Holds Securely —Protects Surfaces



Neoprene washer trapped under head seals hole—acts as cushion.

Tuff-Tite is a new multi-purpose fastener that gives tight, leakproof seating without cracking or chipping porcelain enamel and other fine finishes. It also dampens vibration by acting as a shock absorber and eliminating squeaks and chatter.

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**Trademark*

The neoprene is forced into the hole and around the threads to provide a cushion which protects the surface and forms a watertight and airtight seal.

Tuff-Tite fasteners are used for quick, secure, leakproof fastening of metals and plastics. They are available as tapping screws, thread cutting screws, drive screws, machine screws, stove bolts, wood screws and special fasteners. They are made of carbon, alloy and stainless steel, aluminum, brass and other metals in a variety of head styles.

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Street_____

City_____ Zone_____ State_____

Steel Prices

Mill prices as reported to STEEL, cents per pound except as otherwise noted. *Changes shown in italics.* Code numbers following mill points indicate producing company. Key on page 109. Key to footnotes, Page 111.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)

Munhall,Pa. U5	$65.50

INGOTS, Alloy (NT)

Detroit R7	$69.00
Houston 85	74.00
Midland,Pa. C18	69.00
Munhall,Pa. U5	69.00

BILLETS, BLOOMS & SLABS Carbon, Rerolling (NT)

Aliquippa,Pa. J5	$68.50
Bessemer,Pa. U5	68.50
Bridgeport,Conn. N19	73.50
Buffalo R2	68.50
Clairton,Pa. U5	68.50
Ensley,Ala. T2	68.50
Fairfield,Ala. T2	68.50
Fontana,Calif. K1	76.00
Gary,Ind. U5	68.50
Johnstown,Pa. B2	68.50
Lackawanna,N.Y. B2	68.50
LoneStar,Tex. L6	74.50
Munhall,Pa. U5	68.50
Pittsburgh J5	68.50
S.Chicago,Ill. R2, U5,	68.50
S.Duquesne,Pa. U5	68.50
Youngstown R2	68.50

Carbon, Forging (NT)

Aliquippa,Pa. J5	$84.50
Bessemer,Pa. U5	84.50
Bridgeport,Conn. N19	89.50
Buffalo R2	84.50
Canton,O. R2	86.50
Clairton,Pa. U5	84.50
Conshohocken,Pa. A3	89.50
Ensley,Ala. T2	84.50
Fairfield,Ala. T2	84.50
Fontana,Calif. K1	92.00
Gary,Ind. U5	84.50
Geneva,Utah C11	84.50
Houston 85	89.50
Johnstown,Pa. B2	84.50
Lackawanna,N.Y. B2	84.50
LosAngeles B3	94.00
Midland,Pa. C18	84.50
Munhall,Pa. U5	84.50
Pittsburgh J5	84.50
Seattle B3	98.00
S.Chicago R2,U5,W14	84.50
S.Duquesne,Pa. U5	84.50
S.SanFrancisco B3	94.00

Alloy, Forging (NT)

Bethlehem,Pa. B2	$96.00
Buffalo R2	96.00
Canton,O. R2, T7	96.00
Conshohocken,Pa. A3	103.00
Detroit R7	96.00
Fontana,Calif. K1	115.00
Gary,Ind. U5	96.00
Houston 85	101.00
Ind.Harbor,Ind. Y1	96.00
Johnstown,Pa. B2	96.00
Lackawanna,N.Y. B2	96.00
LosAngeles B3	116.00
Massillon,O. R2	96.00
Midland,Pa. C18	96.00
Munhall,Pa. U5	96.00
S.Chicago R2,U5,W14	96.00
S.Duquesne,Pa. U5	96.00
Struthers,O. Y1	96.00
Warren,O. C17	96.00

ROUNDS, SEAMLESS TUBE (NT)

Buffalo R2	$103.50
Canton,O. R2	103.50
Cleveland R2	103.50
Gary,Ind. U5	103.50
S.Chicago R2,W14	103.50
S.Duquesne,Pa. U5	103.50

SKELP

Aliquippa,Pa. J5	4.325
LoneStar,Tex. L6	4.625
Munhall,Pa. U5	4.225
SparrowsPoint,Md. B2	4.225
Warren,O. R2	4.225
Youngstown R2, U5	4.225

WIRE RODS

AlabamaCity,Ala. R2	5.375
Aliquippa,Pa. J5	5.025
Alton,Ill. L1	5.20
Buffalo B11	5.025
Buffalo W12	5.375
Cleveland A7	5.375
Donora,Pa. A7	5.375
Fairfield,Ala. T2	5.375
Houston 85	5.275
IndianaHarbor,Ind. Y1	5.025
Johnstown,Pa. B2	5.025
Joliet,Ill. A7	5.375
KansasCity,Mo. S5	5.275
Kokomo,Ind. C16	*5.475*
LosAngeles B3	5.825
Minnequa,Colo. C10	5.275
Monessen,Pa. P7	5.025
N.Tonawanda,N.Y. B11	5.025
Pittsburg,Calif. C11	5.675
Portsmouth,O. P12	*5.375*
Roebling,N.J. R5	5.125
S.Chicago,Ill. R2	5.375
SparrowsPoint,Md. B2	5.125
Sterling,Ill.(1) N15	5.025
Sterling,Ill. N15	5.125
Struthers,O. Y1	5.025
Worcester,Mass. A7	5.675

STRUCTURALS

Carbon Steel Std. Shapes

Ala.City,Ala. R2	4.60
Aliquippa,Pa. J5	4.60
Bessemer,Ala. T2	4.60
Bethlehem,Pa. B2	4.65
Birmingham C15	5.10
Clairton,Pa. U5	4.60
Fairfield,Ala. T2	4.60
Fontana,Calif. K1	5.25
Gary,Ind. U5	4.60
Geneva,Utah C11	4.60
Houston 85	4.70
Ind.Harbor,Ind. I-2	4.60
Johnstown,Pa. B2	4.65
KansasCity,Mo. S5	4.70
Lackawanna,N.Y. B2	4.65
LosAngeles B3	5.30
Minnequa,Colo. C10	4.90
Munhall,Pa. U5	4.60
Niles,Calif. P1	5.25
Portland,Oreg. O4	5.35
Phoenixville,Pa. P4	5.15
Seattle B3	5.35
S.Chicago U5, W14	4.60
S.SanFrancisco B3	5.25
Torrance,Calif. C11	5.30
Weirton,W.Va. W6	4.60

Wide Flange

Bethlehem,Pa. B2	4.65
Clairton,Pa. U5	4.60
Fontana,Calif. K1	5.40
Lackawanna,N.Y. B2	4.65
Munhall,Pa. U5	4.60
Phoenixville,Pa. P4	5.15
S.Chicago,Ill. U5	4.60

Alloy Std. Shapes

Clairton,Pa. U5	5.65
Fontana,Calif. K1	7.30
Gary,Ind. U5	5.65
Houston 85	5.75
Munhall,Pa. U5	5.65
S.Chicago,Ill. U5	5.65

H.S., L.A. Std. Shapes

Aliquippa,Pa. J5	6.75
Bessemer,Ala. T2	6.75
Bethlehem,Pa. B2	6.80
Clairton,Pa. U5	6.75
Fairfield,Ala. T2	6.75
Fontana,Calif. K1	7.40
Gary,Ind. U5	6.75
Geneva,Utah C11	6.75
Houston 85	6.85
Ind.Harbor,Ind. I-2, Y1	6.75
Johnstown,Pa. B2	6.80
KansasCity,Mo. S5	6.85
Lackawanna,N.Y. B2	6.80
LosAngeles B3	7.45
Munhall,Pa. U5	6.75
Seattle B3	7.50
S.Chicago,Ill. U5, W14	6.75
S.SanFrancisco B3	7.40
Struthers,O. Y1	6.75

H.S., L.A. Wide Flange

Bethlehem,Pa. B2	6.80
Lackawanna,N.Y. B2	6.80
Munhall,Pa. U5	6.75
S.Chicago,Ill. U5	6.75

PILING

BEARING PILES

Bethlehem,Pa. B2	4.65
Lackawanna,N.Y. B2	4.65
Munhall,Pa. U5	4.60
S.Chicago,Ill. U5	4.60

STEEL SHEET PILING

Ind.Harbor,Ind. I-2	5.45
Lackawanna,N.Y. B2	5.45
Munhall,Pa. U5	5.45
S.Chicago,Ill. U5	5.45

PLATES

PLATES, Carbon Steel

Ala.City,Ala. R2	4.50
Aliquippa,Pa. J5	4.50
Ashland,Ky.(15) A10	4.50
Bessemer,Ala. T2	4.50
Bridgeport,Conn. N19	4.75
Buffalo R2	4.50
Clairton,Pa. U5	4.50
Claymont,Del. C22	4.80
Cleveland J5, R2	4.60
Coatesville,Pa. L7	4.80
Conshohocken,Pa. A3	4.50
Detroit M1	4.60
Ecorse,Mich. G5	4.60
Fairfield,Ala. T2	4.50
Fontana,Calif.(30) K1	5.15
Gary,Ind. U5	4.50
Geneva,Utah C11	4.50
GraniteCity,Ill. G4	4.70
Harrisburg,Pa. P4	5.10
Houston 85	4.60
Ind.Harbor,Ind. I-2, Y1	4.50
Johnstown,Pa. B2	4.50
Lackawanna,N.Y. B2	4.50
LoneStar,Tex. L6	4.85
Mansfield,O. E6	4.50
Minnequa,Colo. C10	5.35
Munhall,Pa. U5	4.50
Newport,Ky. N9	4.50
Pittsburgh J5	4.50
Riverdale,Ill. A1	4.725
Seattle B3	5.40
Sharon,Pa. S3	4.50
S.Chicago R2, U5, W14	4.50
SparrowsPoint,Md. B2	4.50
Steubenville,O. W10	4.50
Warren,O. R2	4.50
Weirton,W.Va. W6	4.50
Youngstown R2, U5, Y1	4.50

PLATES, Carbon Abras. Resist.

Claymont,Del. C22	5.65
Fontana,Calif. K1	6.30
Geneva,Utah C11	5.65
Johnstown,Pa. B2	5.65
SparrowsPoint,Md. B2	5.65

PLATES, Wrought Iron

Economy,Pa. B14	10.40

PLATES, High-Strength Low-Alloy

Aliquippa,Pa. J5	6.725
Bessemer,Ala. T2	6.725
Clairton,Pa. U5	6.725
Cleveland J5, R2	6.725
Claymont,Del. C22	6.725
Coatesville,Pa. L7	7.025
Conshohocken,Pa. A3	6.725
Ecorse,Mich. G5	6.825
Fairfield,Ala. T2	6.725
Fontana,Calif.(30) K1	7.375
Gary,Ind. U5	6.725
Geneva,Utah C11	6.725
Houston 85	6.825
Ind.Harbor,Ind. I-2, Y1	6.725
Johnstown,Pa. B2	6.725
Munhall,Pa. U5	6.725
Pittsburgh J5	6.725
Seattle B3	7.625
Sharon,Pa. S3	6.725
S.Chicago,Ill. U5, W14	6.725
SparrowsPoint,Md. B2	6.725
Youngstown U5, Y1	6.725

PLATES, Alloy

Bridgeport,Conn. N19	6.55
Claymont,Del. C22	6.30
Coatesville,Pa. L7	6.30
Fontana,Calif. K1	6.95
Gary,Ind. U5	6.30
Houston 85	6.40
Ind.Harbor,Ind. Y1	6.30
Johnstown,Pa. B2	6.30
Munhall,Pa. U5	6.30
Newport,Ky. N9	6.30
Seattle B3	7.20
Sharon,Pa. S3	6.30
S.Chicago,Ill. U5, W14	6.30
SparrowsPoint,Md. B2	6.30
Youngstown Y1	6.30

FLOOR PLATES

Cleveland J5	5.575
Conshohocken,Pa. A3	5.575
Harrisburg,Pa. P4	5.575
Ind.Harbor,Ind. I-2	5.575
Munhall,Pa. U5	5.575
S.Chicago,Ill. U5	5.575

PLATES, Ingot Iron

Ashland c.l. (15) A10	4.75
Ashland l.c.l. (15) A10	5.25
Cleveland c.l. R2	5.10
Warren,O. c.l. R2	5.10

BARS

BARS, Hot-Rolled Carbon

Ala.City,Ala.(9) R2	4.65
Aliquippa,Pa.(9) J5	4.65
Alton,Ill. L1	4.85
Atlanta A11	4.85
Bessemer,Ala.(9) T2	4.65
Birmingham C15	5.15
Bridgeport,Conn. N19	4.80
Buffalo(9) R2	4.65
Canton,O.(9) R2	4.75
Clairton,Pa.(9) U5	4.65
Cleveland(9) R2	4.65
Ecorse,Mich. G5	4.75
Emeryville,Calif. J7	5.40
Fairfield,Ala.(9) T2	4.65
FairlessHills,Pa.(9) U5	4.80
Fontana,Calif. K1	5.35
Gary,Ind.(9) U5	4.65
Houston 85	4.90
Ind.Harbor,Ind.(9) I-2	4.65
Ind.Harbor,Ind. Y1	4.65
Johnstown,Pa. B2	4.65
Joliet,Ill. P22	5.15
KansasCity,Mo. S5	4.90
Lackawanna,N.Y. B2	4.65
LosAngeles B3	5.35
Massillon,O.(9) R2	4.75
Midland,Pa. C18	4.65
Milton,Pa. M18	4.65
Minnequa,Colo. C10	5.10
Niles,Calif. P1	5.35
N.Tonawanda,N.Y. B11	4.65
Pittsburg,Calif.(9) C11	5.35
Pittsburgh(9) J-5	4.65
Portland,Oreg. O4	5.40
Seattle B3, N14	5.40
S.Chicago W14	4.65
S.Chicago,Ill.(9) R2, U5	4.65
S.Duquesne,Pa.(9) U5	4.65
S.SanFran.,Calif. B3	5.40
Sterling,Ill.(1) N15	4.65
Sterling,Ill. N15	4.75
Struthers,O. Y1	4.65
Torrance,Calif.(9) C11	5.35
Warren,O.(9) R2	4.65
Weirton,W.Va.(9) W6	4.65
Youngstown(9) R2	4.65
Youngstown(9) U5	4.65

BARS, H.R. Leaded Alloy

Warren,O. C17	6.325

BARS, Hot-Rolled Alloy

Bethlehem,Pa. B2	5.575
Bridgeport,Conn. N19	5.725
Buffalo R2	5.575
Canton,O. R2, T7	5.575
Clairton,Pa. U5	5.575
Detroit R7	5.575
Ecorse,Mich. G5	5.675
Fontana,Calif. K1	6.625
FairlessHills,Pa. U5	5.725
Gary,Ind. U5	5.575
Houston 85	5.825
Ind.Harbor,Ind. I-2, Y1	5.575
Johnstown,Pa. B2	5.575
KansasCity,Mo. S5	5.825
Lackawanna,N.Y. B2	5.575
LosAngeles B3	6.625
Massillon,O. R2	5.575
Midland,Pa. C18	5.575
S.Chicago R2, U5, W14	5.575
S.Duquesne,Pa. U5	5.575
Struthers,O. Y1	5.575
Warren,O. C17	5.575
Youngstown U5	5.575

BARS & SMALL SHAPES, H.R. High-Strength Low-Alloy

Aliquippa,Pa. J5	6.80
Bessemer,Ala. T2	6.80
Bethlehem,Pa. B2	6.80
Clairton,Pa. U5	6.80
Cleveland R2	6.80
Ecorse,Mich. G5	6.90
Fairfield,Ala. T2	6.80
Fontana,Calif. K1	7.50
Gary,Ind. U5	6.80
Houston 85	7.05
Ind.Harb.,Ind. I-2, Y1	6.80
Johnstown,Pa. B2	6.80
KansasCity,Mo. S5	7.05
Lackawanna,N.Y. B2	6.80
LosAngeles B3	7.50
Pittsburgh J5	6.80
Seattle B3	7.55
S.Chicago W14	6.80
S.Duquesne,Pa. U5	6.80
S.SanFrancisco B3	7.55
Struthers,O. Y1	6.80
Warren,O. R2	6.80
Youngstown U5	6.80

BAR SIZE ANGLES; H.R. Carbon

Bethlehem,Pa. B2	4.80

BAR SIZE ANGLES; S. Shapes

Aliquippa,Pa. J5	4.65
Atlanta A11	4.85
Fontana,Calif. K1	5.35
Joliet,Ill. P22	5.10
Niles,Calif. P1	5.35
Pittsburgh J5	4.65
Portland,Oreg. O4	5.40
SanFrancisco S7	5.05

BAR SHAPES, Hot-Rolled Alloy

Clairton,Pa. U5	5.65
Gary,Ind. U5	5.65
Houston 85	5.90
KansasCity,Mo. S5	5.90
Youngstown U5	5.65

BARS, C.F. Leaded Alloy

Ambridge,Pa. W18	8.325
Camden,N.J. P13	8.35
Chicago W18	8.325
Cleveland C20	8.325
Monaca,Pa. S17	8.325
Newark,N.J. W18	8.50
SpringCity,Pa. K3	8.30
Warren,O. C17	8.325

BAR5, Cold-Finished Carbon

Ambridge,Pa. W18	6.25*
BeaverFalls,Pa. M12,R2	6.25*
Buffalo B5	6.30*
Camden,N.J. P13	6.35
Carnegie,Pa. C12	6.25*
Chicago W18	6.25*
Cleveland A7, C20	5.90
Detroit R7	5.90
Detroit B5	6.45*
Detroit P17	6.10
Donora,Pa. A7	5.90
Elyria,O. W8	5.90
FranklinPark,Ill. N5	5.90
Gary,Ind. R2	5.90
GreenBay,Wis. F7	5.90
Hammond,Ind. M13	6.25*
Hammond,Ind. L2	5.90
Hartford,Conn. R2	6.75*
Harvey,Ill. B5	6.25*
LosAngeles S30	7.35
LosAngeles R2	7.70*
Mansfield,Mass. B5	6.80*
Massillon O. R2, R8	5.90
Midland,Pa. C18	5.90
Monaca,Pa. S17	6.25*
Newark,N.J. W18	6.70*
NewCastle,Pa.(17) B4	6.25*
Pittsburgh J5	6.25*
Plymouth,Mich. P6	6.15
Putnam,Conn. W18	6.80*
Readville,Mass. C14	6.80*
S.Chicago,Ill. W14	5.90
SpringCity Pa. W3	6.35
Struthers,O. Y1	5.90
Waukegan,Ill. A7	5.90
Worcester,Mass. W19	6.35
Youngstown F3, Y1	5.90

*Including 0.35c for special quality.

BARS, Cold-Finished Carbon (Turned and Ground)

Cumberland,Md.(5) C19	5.16

BARS, Cold-Finished Alloy

Ambridge,Pa. W18	7.425
BeaverFalls,Pa. M12,R2	7.425
Bethlehem,Pa. B2	7.425
Buffalo B5	7.425
Camden,N.J. P13	7.60
Canton,O. T7	7.425
Carnegie,Pa. C12	7.425
Chicago W18	7.425
Cleveland A7, C20	7.425
Detroit R7	7.425
Detroit B5, P17	7.625
Donora,Pa. A7	7.425
Elyria,O. W8	7.425
Gary,Ind. R2	7.425
GreenBay,Wis. F7	7.425
Hammond,Ind. L2, M13	7.425
Hartford,Conn. R2	7.725
Harvey,Ill. B5	7.425
Lackawanna,N.Y. B2	7.425
LosAngeles S30	9.10
Mansfield,Mass. B5	7.725
Massillon,O. R2, R8	7.425
Midland,Pa. C18	7.425
Monaca,Pa. S17	7.425
Newark,N.J. W18	7.60
Plymouth,Mich. P5	7.625
S.Chicago W14	7.425
SpringCity,Pa. K3	7.60
Struthers,O. Y1	7.425
Warren,O. C17	7.425
Waukegan,Ill. A7	7.425
Worcester,Mass. A7	7.725
Youngstown F3, Y1	7.425

BARS, Reinforcing (To Fabricators)

Ala.City,Ala. R2	4.65
Atlanta A11	4.85
Birmingham C15	5.15
Buffalo R2	4.65
Cleveland R2	4.65
Ecorse,Mich. G5	4.75
Emeryville,Calif. J7	5.40
Fairfield,Ala. T2	4.65
FairlessHills,Pa. U5	4.80
Fontana,Calif. K1	5.35
Ft. Worth,Tex.(42) T4	5.10
Gary,Ind. U5	4.65
Houston 85	4.90

Ind.Harbor,Ind. I-2, Y1 .4.65
Johnstown,Pa. B2 .....4.65
Joliet,Ill. P22 .....5.15
KansasCity,Mo. S5 ....4.90
Lackawanna,N.Y. B2 ..4.65
LosAngeles B3 .....5.35
Milton,Pa. M18 .....4.65
Minnequa,Colo. C10 ....5.10
Niles,Calif. P1 .....5.35
Pittsburg,Calif. C11 ....5.35
Pittsburgh J5 .....4.65
Portland,Oreg. O4 .....5.40
SandSprings,Okla. S5 ..5.15
Seattle B3, N14 .....5.40
S.Chicago R2 .....4.65
S.Duquesne,Pa. U5 .....4.65
S.SanFrancisco B3 ....5.40
SparrowsPoint,Md. B2 ..4.65
Sterling,Ill.(1) N15 ....4.65
Sterling,Ill. N15 .....4.75
Struthers,O. Y1 .....4.65
Torrance,Calif. C11 ....5.35
Youngstown R2, U5, Y1.4.65

BARS, Reinforcing
(Fabricated; to Consumers)

Johnstown,Pa. ½-1" B2 .6.15
KansasCity,Kans. S5 ...6.45
Lackawanna,N.Y. B2 ...6.17
Marion,O. P11 .....6.15
Pittsburgh U8 .....6.17
Seattle B3, N14 .....6.60
SparrowsPt. ½-1" B2...6.15
Williamsport,Pa. S19 ...6.00

RAIL STEEL BARS

ChicagoHts.(3) C2, I-2..4.65
ChicagoHts.(4) C2, I-2..4.65
Ft.Worth,Tex.(26) T4...5.10
Franklin,Pa.(3) F5 ....4.65
Franklin,Pa.(4) F5 ....4.65
JerseyShore,Pa.(4) J8 ..4.50
Marion,O.(3) P11 .....4.65
Moline,Ill.(3) R2 .....4.65
Tonawanda(3) B12 ....4.65
Tonawanda(4) B12 ....5.15
Williamsport,Pa.(3) S19.4.65

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 11.50
Economy,Pa.(D.R.)B14 14.30
Economy(Staybolt)B14 14.65
McK.Rks. (S.R.) L5 ..11.50
McK.Rks. (D.R.) L5 ..16.00
McK.Rks.(Staybolt) L5.17.00

SHEETS

SHEETS, Hot-Rolled Steel
(18 Gage and Heavier)

Ala.City,Ala. R2 .....4.325
Allenport,Pa. P7 .....4.325
Ashland,Ky.(8) A10 ..4.325
Cleveland J5, R2 .....4.325
Conshohocken,Pa. A3 ..4.375
Detroit(8) M1 .....4.425
Dravosburg,Pa. U5 ....4.325
Ecorse,Mich. G5 .....4.425
Fairfield,Ala. T2 .....4.325
FairlessHills,Pa. U5 ...4.375
Fontana,Calif. K1 ....5.075
Gary,Ind. U5 .....4.325
Geneva,Utah C11 .....4.425
GraniteCity,Ill. G4 ....4.525
Ind.Harbor,Ind. I-2, Y1 4.325
Lackawanna,N.Y. B2 ..4.325
Mansfield,O. E6 (37) ..4.325
Munhall,Pa. U5 .....4.325
Newport,Ky.(8) N9 ...4.325
Niles,O. M21 .....4.325
Pittsburg,Calif. C11 ...5.025
Pittsburgh J5 .....4.325
Portsmouth,O. P12 ....4.325
Riverdale,Ill. A1 .....4.55
Sharon,Pa. S3 .....4.325
S.Chicago,Ill. W14 ....4.325
SparrowsPoint,Md. B2 .4.325
Steubenville,O. W10 ...4.325
Warren,O. R2 .....4.325
Weirton,W.Va. W6 ....4.325
Youngstown U5, Y1 ...4.325

SHEETS, H.R. (19 Ga. & Lighter)

Ala.City,Ala. R2 .....5.625
Niles,O. M21 .....5.325

SHEETS, H.R. Alloy

Ind.Harbor,Ind. Y1 ....7.20
Youngstown Y1 .....7.20

SHEETS, H.R. (14 Ga. & Heavier)
High-Strength Low-Alloy

Cleveland J5, R2 .....6.375
Conshohocken,Pa. A3 ..6.425
Dravosburg,Pa. U5 ...6.375
Ecorse,Mich. G5 .....6.475
Fairfield,Ala. T2 .....6.375
FairlessHills,Pa. U5 ...6.425
Fontana,Calif. K1 .....7.125
Gary,Ind. U5 .....6.375
Ind.Harbor,Ind. I-2, Y1 6.375
Lackawanna(35) B2 ..6.375
Munhall,Pa. U5 .....6.375
Pittsburgh J5 .....6.375
Sharon,Pa. S3 .....6.375
S.Chicago,Ill. U5 .....6.375
SparrowsPoint(36) B2..6.375
Warren,O. R2 .....6.375
Weirton,W.Va. W6 ....6.375
Youngstown U5, Y1 ...6.375

SHEETS, Hot-Rolled Ingot Iron
(18 Gage and Heavier)

Ashland,Ky.(8) A10 ...4.575
Ind.Harbor,Ind. I-2....4.575

SHEETS, Cold-Rolled Steel
(Commercial Quality)

Allenport,Pa. P7 .....5.325
Cleveland J5, R2 .....5.325
Conshohocken,Pa. A3 ..5.375
Dravosburg,Pa. U5 ....5.325
Detroit M1 .....5.325
Ecorse,Mich. G5 .....5.425
Fairfield,Ala. T2 .....5.325
FairlessHills,Pa. U5 ..5.375
Follansbee,W.Va. F4 ..5.325
Fontana,Calif. K1 .....6.425
Gary,Ind. U5 .....5.325
GraniteCity,Ill. G4 ....5.525
Ind.Harbor,Ind. I-2, Y1 5.325
Lackawanna,N.Y. B2 ..5.325
Mansfield,O. E6 .....5.325
Middletown,O. A10 ....5.325
Newport,Ky. N9 .....5.325
Pittsburg,Calif. C11 ...6.275
Pittsburgh J5 .....5.325
Portsmouth,O. P12 ....5.325
SparrowsPoint,Md. B2 .5.325
Steubenville,O. W10 ...5.325
Warren,O. R2 .....5.325
Weirton,W.Va. W6 ....5.325
Youngstown Y1 .....5.325

SHEETS, Cold-Rolled
High-Strength Low-Alloy

Cleveland J5, R2 .....7.875
Dravosburg,Pa. U5 ...7.875
Ecorse,Mich. G5 .....7.975
FairlessHills,Pa. U5 ..7.925
Fontana,Calif. K1 .....8.975
Gary,Ind. U5 .....7.875
IndianaHarbor,Ind. Y1.7.875
Lackawanna(37) B2 ..7.875
Pittsburgh J5 .....7.875
SparrowsPoint(38) B2..7.875
Warren,O. R2 .....7.875
Weirton,W.Va. W6 ....7.875
Youngstown Y1 .....7.875

SHEETS, Cold-Rolled Ingot Iron

Middletown,O. A10 ....5.825

SHEETS, Culvert (16 Gage)	Cu Alloy	Cu Fe
Ashland,Ky.	A10	6.90	...
Canton,O.	R2	6.10	6.55
Dravosburg	U5	6.10	...
Fairfield	T2	6.10	...
Gary,Ind.	U5	6.10	6.35
Ind.Harbor	I-2	6.10	6.35
Kokomo,Ind.	C16	6.20	...
MartinsFry.	W10	6.10	...
Newport,Ky.	N9	6.10	6.35
Pitts.,Calif.	C11	6.85	...
SparrowsPt.	B2	6.10	...

SHEETS, Culvert—Pure Iron

Ashland,Ky. A10 .....7.15
Gary,Ind. U5 .....6.35
MartinsFry.,O. W10 ....6.35

SHEETS, Galvanized Steel
Hot-Dipped

Ala.City,Ala. R2 .....5.85‡
Ashland,Ky. A10 .....5.85†
Canton,O. R2 .....5.85‡
Dover,O. R1 .....5.85†
Dravosburg,Pa. U5 ....5.85†
Fairfield,Ala. T2 .....5.85†
Gary,Ind. U5 .....5.85*
GraniteCity,Ill. G4 ....6.05
Ind.Harbor,Ind. I-2 ....5.85‡
Kokomo,Ind. C16 .....5.95‡
MartinsFerry,O. W10 ..5.85*
Middletown,O. A10 ....5.85†
Newport,Ky. N9 .....5.85‡
Pittsburg,Calif. C11 ..6.60*
SparrowsPt.,Md. B2 ..5.85†
Warren,O. R2 .....5.85†
Weirton,W.Va. W6 ....5.85*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Well Casing

Fontana,Calif. K1 ....6.575

SHEETS, Galvanized
High-Strength Low-Alloy

Dravosburg,Pa. U5 ....8.60
SparrowsPoint(39) B2 ..8.60

SHEETS, Galvannealed Steel

Canton,O. R2 .....6.25
Dravosburg,Pa. U5 ....6.25
Kokomo,Ind. C16 .....6.60
Newport,Ky. N9 .....6.25

SHEETS, Galvanized Ingot Iron
(Hot-dipped Continuous)

Ashland,Ky. A10 .....6.10
Middletown,O. A10 ....6.10

SHEETS, Electrogalvanized

Cleveland(28) R2 .....6.70
Niles,O.(28) R2 .....6.70
Weirton,W.Va. W6 ....6.55

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1)..8.50
Butler,Pa. A10 (type 2)..8.60

SHEETS, Enameling Iron

Ashland,Ky. A10 .....5.90
Cleveland R2 .....5.90
Dravosburg,Pa. U5 ....5.90
Gary,Ind. U5 .....5.90
GraniteCity,Ill. G4 ....6.10
Ind.Harbor,Ind. I-2 ....5.90
Middletown,O. A10 ....5.90
Niles,O. M21 .....5.90
Youngstown Y1 .....5.90

BLUED STOCK, 29 Gage

Follansbee,W.Va. F4 ...7.75
Ind.Harbor,Ind. I-2 ....7.75
Yorkville,O. W10 .....7.75

SHEETS, Long Terne Steel
(Commercial Quality)

BeechBottom,W.Va. W10 6.25
Gary,Ind. U5 .....6.25
Mansfield,O. E6 .....6.25
Middletown,O. A10 ....6.25
Niles,O. M21 .....6.25
Weirton,W.Va. W6 ....6.25

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....6.65

Key to Producers

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.

B1 Babcock & Wilcox Co.
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div. Colo. Fuel & Iron
B11 Buffalo Bolt Co., Div., Buffalo-Eclipse Corp.
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div. Borg-Warner Corp.
C4 Carpenter Steel Co.
C7 Cleve. Cold Rolling Mills
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div. H. K. Porter Co. Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Steel Products Dept. Wickwire Spencer Steel Division
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel Div., Sharon Steel Corp
D4 Disston & Sons, Henry
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div. Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G2 Globe Iron Co.
G4 Granite City Steel Co.
G6 Greer Steel Co.
G5 Great Lakes Steel Corp.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins, E., Steel Tube
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M13 Monarch Steel Div., Jones & Laughlin Steel Corp.
M14 McInnes Steel Co.
M16 Md.Fine&Special. Wire
M17 Metal Forming Corp.
M18 Milton Steel Prod. Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Titanium Corp.

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 NewEng.HighCarb.Wire
N8 Newman-Crosby Steel
N9 Newport Steel Corp.
N14 Northwest.SteelRoll.Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.
N.9 Northeastern Steel Corp.

O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills

P1 PacificStatesSteelCorp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co. Sub. of Barium Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Division Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.

R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 RelianceDiv.,EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Steel Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Corp.
S40 Seneca Steel Service

T2 Tenn. Coal & Iron Div. U. S. Steel Corp.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Strip Division, Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.
T13 Tube Methods Inc.

U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div. U. S. Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Division, H. K. Porter Co. Inc.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W. Va. Steel&Mfg. Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
W19 Worcester Pressed Steel

Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2 ..4.325
Allenport,Pa. P7 .....4.325
Alton,Ill. L1 .....4.50
Ashland,Ky.(8) A10 ..4.325
Atlanta A11 .....4.525
Bessemer,Ala. T2 .....4.325
Birmingham C15 .....4.825
Bridgeport,Conn. N19 ..4.625
Buffalo(27) R2 .....4.325
Conshohocken,Pa. A3 ..4.375
Detroit M1 .....4.425
Ecorse,Mich. G5 .....4.425
Fairfield,Ala. T2 .....4.325
Fontana,Calif. K1 ....5.075
Gary,Ind. U5 .....4.325
Ind.Harbor,Ind. I-2, Y1.4.325
Johnstown,Pa.(25) B2..4.325
Lackaw'na,N.Y.(24) B2 4.325
LosAngeles(25) B3 ....5.075
Milton,Pa. M18 .....4.325
Minnequa,Colo. C10 ...5.425
Pittsburg,Calif. C11 ...5.075
Portsmouth,O. P12 ....4.325
Riverdale,Ill. A1 .....4.55
SanFrancisco S7 .....5.05
Seattle(25) B3 .....5.325
Seattle N14 .....5.40
Sharon,Pa. S3 .....4.325
S.Chicago,Ill. W14 ....4.325
S.SanFrancisco(25) B3..5.075
SparrowsPoint,Md. B2..4.325
Sterling(1) N15 .....4.325
Sterling,Ill. N15 .....4.425
Torrance,Calif. C11 ...5.075
Warren,O. R2 .....4.325
Weirton,W.Va. W6 ....4.325
Youngstown U5 .....4.325

STRIP, Hot-Rolled Alloy

Bridgeport,Conn. N19 ..7.50
Carnegie,Pa. S18 .....7.20
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....7.20
Ind.Harbor,Ind. Y1 ....7.20
LosAngeles B3 .....8.40
Newport,Ky. N9 .....7.20
Sharon,Pa. S3 .....7.20
S.Chicago W14 .....7.20
Youngstown U5, Y1 ....7.20

STRIP, Hot-Rolled High-Strength Low-Alloy

Bessemer,Ala. T2 .....6.425
Conshohocken,Pa. A3...6.425
Ecorse,Mich. G5 .....6.525
Fairfield,Ala. T2 .....6.425
Fontana,Calif. K1 ....7.525
Gary,Ind. U5 .....6.425
Houston S5 .....6.675
Ind.Harbor,Ind. I-2, Y1.6.425
KansasCity,Mo. S5 ....6.675
Lackawanna,N.Y. B2 ..6.425
LosAngeles(25) B3 ....7.175
Seattle(25) B3 .....7.425
Sharon,Pa. S3 .....6.425
S.SanFrancisco(25) B3.7.175
SparrowsPoint,Md. B2..6.425
Warren,O. R2 .....6.425
Weirton,W.Va. W6 ....6.425
Youngstown U5, Y1 ...6.425

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ...4.575

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6 .....6.25
Baltimore T6 .....6.25
Boston T6 .....6.80
Buffalo S40 .....6.25
Cleveland A7, J5 .....6.25
Conshohocken,Pa. A3 ..6.30
Dearborn,Mich. D3 .....6.35
Detroit D2, M1, P20....6.35
Dover,O. G6 .....6.25
Ecorse,Mich. G5 .....6.35
Follansbee,W.Va. F4 ...6.25
Fontana,Calif. K1 .....8.00
FranklinPark,Ill. T6 ...6.35
Ind.Harbor,Ind. I-2 ....6.35
Ind.Harbor,Ind. Y1 ....6.25
Indianapolis C8 .....6.40
Lackawanna,N.Y. B2 ..6.25
LosAngeles C1 .....8.30
NewBedford,Mass. R10..6.70
NewBritain(10) S15 ....6.25
NewCastle,Pa. B4, E5..6.25
NewHaven,Conn. A7, D2 6.70
NewKensington,Pa. A6..6.25
Pawtucket,R.I. R3 .....6.90
Pawtucket,R.I. N8 ....6.80
Pittsburgh J5 .....6.25
Riverdale,Ill. A1 .....6.35
Rome,N.Y.(32) R6 .....6.25
Sharon,Pa. S3 .....6.25
SparrowsPt.,Md. B2 ....6.25
Trenton,N.J.(31) R5 ...7.80
Wallingford,Conn. W2 ..6.70
Warren,O. R2, T5 .....6.25
Weirton,W.Va. W6 .....6.25
Worcester,Mass. A7 ....6.80
Youngstown C8, Y1 ....6.25

STRIP, Cold-Rolled Alloy

Boston T6 .....13.80
Carnegie,Pa. S18 .....13.45
Cleveland A7 .....13.45
Dover,O. G6 .....13.45
FranklinPark,Ill. T6 ..13.45
Harrison,N.J. C18 ....13.45
Indianapolis C8 .....13.60
Pawtucket,R.I. N8 ....13.80
Sharon,Pa. S3 .....13.45
Worcester,Mass. A7 ...13.75
Youngstown C8 .....13.45

STRIP, Cold-Rolled High-Strength Low-Alloy

Cleveland A7 .....9.10
Dearborn,Mich. D3 ....9.20
Dover,O. G6 .....9.30
Ecorse,Mich. G5 .....9.20
Ind.Harbor,Ind. Y1 ....9.30

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	7.40	9.35	10.90	12.95	15.75
Boston T6	7.65	9.35	10.90	13.05	15.75
Bristol,Conn. W1	...	...	10.80	12.95	15.65
Carnegie,Pa. S18	...	9.05	10.60	12.75	....
Cleveland A7	7.10	9.05	10.60	12.75	15.45
Cleveland C7	...	8.95	10.50	12.65	15.35
Dearborn,Mich. D3	7.20	9.15	10.70	....	....
Detroit D2	7.20	9.15	10.70	12.85	....
Dover,O. G6	7.10	9.05	10.60	12.75	15.45
Follansbee,W.Va. F4	7.00	8.95	10.50**	....	....
FranklinPark,Ill. T6	7.20	9.05	10.60	12.75	15.45
Harrison,N.J. C18	...	...	10.80	12.95	15.65
Indianapolis C8	7.25	9.20	10.60	12.75	15.45
NewBritain,Conn.(10) S15.	7.10	9.05	10.60	12.75	15.45
NewCastle, Pa. B4, E5	7.10	9.05	10.60	12.75	....
NewHaven,Conn. D2	7.55	9.35	10.90	13.05	....
NewKensington,Pa. A6	7.10	9.05	10.60	....	....
New York W3	...	9.35	10.90	13.05	15.75
Pawtucket,R.I. N8	7.65	9.35	10.90	13.05	15.75
Riverdale,Ill. A1	7.20	9.05	10.60	12.75	15.45
Rome,N.Y.(32) R6	7.00	8.95	10.50	12.65	15.35
Sharon,Pa. S3	7.10	9.05	10.60	12.75	15.45
Trenton,N.J. R5	...	9.35	10.90	13.05	15.75
Wallingford,Conn. W2	7.45	9.25	10.80	12.95	15.65
Warren,O. T5	7.10	9.05	10.60	12.75	15.45
Weirton,W.Va. W6	7.10	9.05	10.60	12.75	15.45
Worcester,Mass. A7, J6	7.65	9.35	10.90	13.05	15.75
Youngstown C8	7.10	9.05	10.60	12.75	15.45

**0.65 C, max.

Spring Steel (Tempered)					
Bristol,Conn. W1	...	...	14.40	17.60	....
Buffalo W12	...	...	14.40	....	....
FranklinPark,Ill. T6	...	...	14.90	18.10	21.50
Harrison,N.J. C18	...	...	14.40	17.60	21.00
NewYork W3	...	...	14.40	17.60	21.00
Trenton,N.J. R5	...	...	14.40	17.60	21.00
Worcester,Mass. W12	...	...	14.40	....	....
Worcester,Mass. A7, T6	...	...	14.40	17.60	21.00
Youngstown C8	...	...	15.00	18.35	22.35

STRIP, Galvanized (Continuous)

Sharon,Pa. S3 .....6.55

TIGHT COOPERAGE HOOP

Atlanta A11 .....5.05
Riverdale,Ill. A1 .....4.90
Sharon,Pa. S3 .....4.75
Youngstown U5 .....4.75

STRIP, Electrogalvanized

Cleveland A7 .....6.25*
Dover,O. G6 .....6.25*
Riverdale,Ill. A1 .....6.35*
Youngstown C8 .....6.25*
Warren,O. T5 .....6.25*
Warren,O. B9 .....6.45*
Weirton,W.Va. W6 ....5.75*
Worcester,Mass. A7 ...6.80*

*Plus galvanizing extras.

SILICON STEEL

H.R. SHEETS(22 Ga., cut lengths)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	...	...	9.95	10.95	11.85
Brackenridge,Pa. A4	...	...	9.95	10.95	11.85
Mansfield,O. E6	8.40	9.35	9.95	10.95	11.85
Newport,Ky. N9	8.40	9.35	9.95	10.95	11.85
Niles,O. M21	8.40	9.35	9.95	10.95	....
Vandergrift,Pa. U5	...	9.35	9.95	10.95	11.85
Warren,O. R2	8.40	9.35	9.95	10.95	11.85
Zanesville,O. A10	...	9.35	9.95	10.95	11.85

C.R. COILS & CUT LENGTHS, (22 Ga.) Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
Brackenridge,Pa. A4	....	....	10.70	11.70	12.60
GraniteCity,Ill. G4	8.80*	9.80*	10.40*	11.40*	....
IndianaHarbor,Ind. I-2	8.60†	9.60*	10.20*	11.20*	....
Vandergrift,Pa. U5	....	10.10†	10.70†	11.70†	12.60†
Vandergrift,Pa. U5	8.60*	9.60*	10.20*	11.20*	12.10*
Warren,O. R2	8.60†	10.10	10.70	11.70	12.60

H.R. SHEETS (22 Ga., cut lengths)	Transformer Grade T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	12.80	13.35	13.85	14.85
Brackenridge,Pa. A4	12.80	....	....	....
Newport,Ky. N9	12.80	....	....	....
Vandergrift,Pa. U5	12.80	13.35	13.85	14.85
Zanesville,O. A10	12.80§	13.35§	13.85§	14.85§

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-72
Brackenridge,Pa. A4	....	15.85	17.45	17.95	13.55‡
Butler,Pa. A10	....	....	17.45	17.95	....
Vandergrift,Pa. U5	14.85	15.85	17.45	17.95	13.55
Warren,O. R2	....	....	....	....	13.55‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed, semiprocessed ½c lower. §Coils, ¾-cent higher.

TIN MILL PRODUCTS

TIN PLATE Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$7.90	$8.15	$8.55
Dravosburg,Pa. U5	7.90	8.15	8.55
Fairfield,Ala. T2	8.00	8.25	8.65
FairlessHills,Pa. U5	8.00	8.25	8.65
Gary,Ind. U5	7.90	8.15	8.55
GraniteCity,Ill. G4	8.00	8.25	8.65
IndianaHarbor,Ind. I-2, Y1	7.90	8.15	8.55
Niles,O. R2	7.90	8.15	8.55
Pittsburg,Calif. C11	8.65	8.90	9.30
SparrowsPoint,Md. B2	8.00	8.25	8.65
Weirton,W.Va. W6	7.90	8.15	8.55
Yorkville,O. W10	7.90	8.15	8.55

ELECTROTIN (22-27 Gage; Dollars per 100 lb)			
Aliquippa,Pa. J5	6.675	....	....
Niles,O. R2	6.675	6.875	7.075

TINPLATE, American Coke (Base Box)	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$9.20	$9.45
Dravosburg,Pa.U5	9.20	9.45
Fairfield,Ala. T2	9.30	9.55
Fairless,Pa. U5	9.30	9.55
Gary,Ind. U5	9.20	9.45
Ind.Har. I-2, Y1	9.20	9.45
Pitts.,Calif. C11	9.95	10.20
Sp.Pt.,Md. B2	9.30	9.55
Weirton,W.Va. W6	9.20	9.45
Yorkville,O. W10	9.20	9.45

BLACK PLATE (Base Box)

Aliquippa,Pa. J5 .....$7.00
Dravosburg,Pa. U5 ....7.00
Fairfield,Ala. T2 .....7.10
FairlessHills,Pa. U5 ....7.10
Gary,Ind. U5 .....7.00
GraniteCity,Ill. G4 .....7.10
Ind.Harbor,Ind. I-2, Y1.7.00
Niles,O. R2 .....7.00
Pittsburg,Calif. C11 ....7.75

SparrowsPoint,Md. B2	7.10
Warren,O. R2	7.00
Weirton,W.Va. W6	7.00
Yorkville,O. W10	7.00

HOLLOWARE ENAMELING Black Plate (29 Gage)

Dravosburg,Pa. U5 ....6.65
Gary,Ind. U5 .....6.65
GraniteCity,Ill. G4 .....6.75
Ind.Harbor,Ind. Y1 ....6.65
Yorkville,O. W10 .....6.65

MANUFACTURING TERNES (Special Coated; Base Box)

Dravosburg,Pa. U5 ...$8.70
Gary,Ind. U5 .....8.70
Yorkville,O. W10 .....8.70

MANUFACTURING TERNES (Light Coated, 6 lb; Base Box)

Yorkville,O. W10 .....$9.15

ROOFING SHORT TERNES (8 lb Coated; Base Box)

Gary,Ind. U5 .....$10.25

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2 ..6.60
Aliquippa,Pa. J5 .....6.25
Alton,Ill. L1 .....6.425
Atlanta A11 .....6.45
Bartonville,Ill. K4 .....6.35
Buffalo W12 .....6.60
Chicago W13 .....6.25
Cleveland A7 .....6.60
Crawfordsville,Ind. M8..6.35
Donora,Pa. A7 .....6.60
Duluth,Minn. A7 .....6.60
Fairfield,Ala. T2 .....6.60
Fostoria,O.(24) S1 .....6.45
Houston S5 .....6.50
Jacksonville,Fla. M8 ...6.77
Johnstown,Pa. B2 .....6.25
Joliet,Ill. A7 .....6.60
KansasCity,Mo. S5 ....6.50
Kokomo,Ind. C16 .....6.70
LosAngeles B3 .....7.20
Minnequa,Colo. C10 ....6.50
Monessen,Pa. P7 .....6.25
Newark 6-8 ga. I-1 ....6.90
N.Tonawanda B11 .....6.25
Palmer,Mass. W12 ....6.90
Pittsburg,Calif. C11 ....7.20
Portsmouth,O. P12 .....6.60
Rankin,Pa. A7 .....6.60
S.Chicago,Ill. R2 .....6.60
S.SanFrancisco C10 ....7.20
SparrowsPoint,Md. B2 ..6.35
Sterling,Ill.(1) N15 ....6.25
Sterling,Ill. N15 .....6.35
Struthers,O. Y1 .....6.25
Waukegan,Ill. A7 .....6.60
Worcester,Mass. A7 ....6.90

WIRE, MB Spring, High Carbon

Aliquippa,Pa. J5 .....7.90
Alton,Ill. L1 .....8.075
Bartonville,Ill. K4 .....8.00
Buffalo W12 .....7.90
Cleveland A7 .....7.90
Donora,Pa. A7 .....7.90
Duluth,Minn. A7 .....7.90
Fostoria,O. S1 .....7.95
Johnstown,Pa. B2 .....7.90
LosAngeles B3 .....8.85
Milbury,Mass.(12) N6 ..8.20
Minnequa,Colo. C10 ....8.15
Monessen,Pa. P16 .....7.90
Muncie,Ind. I-7 .....8.10
Palmer,Mass. W12 .....8.20
Pittsburg,Calif. C11 ....8.85
Portsmouth,O. P12 .....7.90
Roebling,N.J. R5 .....8.20
S.Chicago,Ill. R2 .....7.90
S.SanFrancisco C10 ....8.85
SparrowsPt.,Md. B2 ....8.00
Struthers,O. Y1 .....7.90
Trenton,N.J. A7 .....8.20
Waukegan,Ill. A7 .....7.90
Worcester A7,J4,T6,W12.8.20

WIRE, Upholstery Spring

Aliquippa,Pa. J5 .....7.60
Alton,Ill. L1 .....7.775
Buffalo W12 .....7.60
Cleveland A7 .....7.60
Donora,Pa. A7 .....7.60
Duluth,Minn. A7 .....7.60
Johnstown,Pa. B2 .....7.60
KansasCity,Mo. S5 .....7.85
LosAngeles B3 .....8.55
Minnequa,Colo. C10 ...7.775
Monessen,Pa. P16 .....7.60
NewHaven,Conn. A7 ....7.90
Palmer,Mass. W12 .....7.90
Pittsburg,Calif. C11 ....8.55
Portsmouth,O. P12 .....7.60
Roebling,N.J. R5 .....7.90
S.Chicago,Ill. R2 .....7.60
S.SanFrancisco C10 ....8.55
SparrowsPoint,Md. B2 ..7.70
Struthers,O. Y1 .....7.60
Trenton,N.J. A7 .....7.90
Waukegan,Ill. A7 .....7.60
Worcester,Mass. A7 ....7.90

WIRE, Fine & Weaving (8" Coils)

Alton,Ill. L1 .....12.725
Bartonville,Ill. K4 ....12.65
Buffalo W12 .....12.55
Chicago W13 .....12.55
Cleveland A7 .....12.55
Crawfordsville,Ind. M8.12.65
Fostoria,O. S1 .....12.55
Jacksonville,Fla. M8 ..13.08
Johnstown,Pa. B2 .....12.55
Kokomo,Ind. C16 .....12.55
Minnequa,Colo. C10 ....12.30
Monessen,Pa. P6 .....12.55
Muncie,Ind. I-7 .....12.75
Palmer,Mass. W12 .....12.85
Roebling,N.J. R5 .....12.85
S.SanFrancisco C10 ....12.90
Waukegan,Ill. A7 .....12.55
Worcester,Mass. A7,T6.12.85

WIRE, Gal'd ACSR for Cores

Bartonville,Ill. K4 .....10.70
Buffalo W12 .....10.70
Johnstown,Pa. B2 .....10.70
Minnequa,Colo. C10 ..10.825
Monessen,Pa. P16 .....10.70
Muncie,Ind. I-7 .....10.90
Pittsburg,Calif. C11 ...11.50
Portsmouth,O. P12 .....10.70
Roebling,N.J. R5 .....11.00
SparrowsPt.,Md. B2 ...10.80

ROPE WIRE (A)

Bartonville,Ill. K4 .....10.55
Buffalo W12 .....10.55
Fostoria,O. S1 .....10.55
Johnstown,Pa. B2 .....10.55
Monessen,Pa. P16 .....10.55
Muncie,Ind. I-7 .....10.75
Palmer,Mass. W12 .....10.85
Portsmouth,O. P12 .....10.55
Roebling,N.J. R5 .....10.85
SparrowsPt. B2 .....10.65
Struthers,O. Y1 .....10.55
Worcester,Mass. J4 ....10.85

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE
(Continued)

WIRE, Tire Bead

Bartonville,Ill. K4	....14.15
Monessen,Pa. P16	.....14.20
Roebling,N.J. R5	.....14.35

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	.....9.00
Baltimore T6	.....9.30
Buffalo W12	.....9.00
Cleveland A7	.....9.00
Crawfordsville,Ind. M8	..9.00
Dover,O. C6	.....9.00
Fostoria,O. S1	.....9.00
FranklinPark,Ill. T6	....9.10
Kokomo,Ind. C16	.....9.00
Massillon,O. R8	.....9.00
Milwaukee C23	.....9.20
Monessen,Pa. P16	.....9.00
Pawtucket,R.I. N8	.....9.30
Riverdale,Ill. A1	.....9.10
Rome,N.Y. R6	.....9.00
Trenton,N.J. R5	.....9.30
Worcester A7, T6, W12	..9.30

NAIL, Stock

To Dealers & Mfrs. (7)	Col.
AlabamaCity,Ala. R2	...152
Aliquippa,Pa. J5	152
Atlanta A11	154
Bartonville,Ill. K4	154
Chicago,Ill. W13	152
Cleveland A9	157
Crawfordsville,Ind. M8	..154
Donora,Pa. A7	152
Duluth,Minn. A7	152
Fairfield,Ala. T2	152
Galveston,Tex. D7	157
Houston,Tex. S5	157
Johnstown,Pa. B2	152
Joliet,Ill. A7	152
KansasCity,Mo. S5	157
Kokomo,Ind. C16	154
Minnequa,Colo. C10	157
Monessen,Pa. P7	152
Pittsburg,Calif. C11	171
Rankin,Pa. A7	152
S.Chicago,Ill. R2	152
SparrowsPt.,Md. B2	154
Sterling,Ill.(1) N15	152
Worcester,Mass. A7	158

NAILS, CUT (100 lb keg)

To Dealers (33)	
Conshohocken,Pa. A3	...$9.05
Wheeling,W.Va. W10	...9.05

STAPLES, Polished Stock

To Dealers & Mfrs. (7)	Col.
Aliquippa,Pa. J5	152
Atlanta A11	154
Bartonville,Ill. K4	154
Crawfordsville,Ind. M8	..154
Donora,Pa. A7	152
Duluth,Minn. A7	152
Fairfield,Ala. T2	152
Johnstown,Pa. B2	152
Joliet,Ill. A7	152
Kokomo,Ind. C16	154
Minnequa,Colo. C10	157
Monessen,Pa. P7	152
Pittsburg,Calif. C11	171
Rankin,Pa. A7	152
SparrowsPt.,Md. B2	154
Sterling,Ill.(1) N15	152
Worcester,Mass. A7	158

TIE WIRE, Automatic Baler
(14½ Ga.) (Per 97 lb Net Box)

Coil No. 3150	
AlabamaCity,Ala. R2	..$9.35
Bartonville,Ill. K4	.....9.45
Buffalo W12	.....9.35
Crawfordsville,Ind. M8	..9.46
Donora,Pa. A7	.....9.35
Duluth,Minn. A7	.....9.35
Johnstown,Pa. B2	.....9.35
Joliet,Ill. A7	.....9.35
Kokomo,Ind. C16	.....9.45
LosAngeles B3	.....10.14
Minnequa,Colo. C10	....9.60
Pittsburg,Calif. C11	...10.13
S.Chicago Ill. R2	.....9.35
SparrowsPt.,Md. B2	...9.45
Sterling,Ill. N15	.....9.35

Coil No. 6500 Stand.	
AlabamaCity,Ala. R2	..$9.65
Bartonville,Ill. K4	.....9.75
Buffalo W12	.....9.65
Crawfordsville,Ind. M8	..9.75
Donora,Pa. A7	.....9.65
Duluth,Minn. A7	.....9.65
Johnstown,Pa. B3	.....9.65
Joliet,Ill. A7	.....9.65
Kokomo,Ind. C16	.....9.75
LosAngeles B3	.....10.45
Minnequa,Colo. C10	....9.90
Pittsburg,Calif. C11	...10.45
S.Chicago,Ill. R2	.....9.65
SparrowsPt.,Md. B2	....9.75
Sterling,Ill. N15	.....9.65

Coil No. 6500 Interim	
AlabamaCity,Ala. R2	..$9.70
Bartonville,Ill. K4	.....9.80
Buffalo W12	.....9.70
Crawfordsville,Ind. M8	..9.80
Donora,Pa. A7	.....9.70
Duluth,Minn. A7	.....9.70
Johnstown,Pa. B2	.....9.70
Joliet,Ill. A7	.....9.70
Kokomo,Ind. C16	.....9.80
LosAngeles B3	.....10.50
Minnequa,Colo. C10	....9.95
Pittsburg,Calif. C11	...10.50
S.Chicago,Ill. R2	.....9.70
SparrowsPt.,Md. B2	...9.80
Sterling,Ill. N15	.....9.70

WIRE, Barbed — Col.

AlabamaCity,Ala. R2	..175**
Aliquippa,Pa. J5	.....172‡
Atlanta A11	181
Bartonville,Ill. K4	181
Crawfordsville,Ind. M8	..181
Donora,Pa. A7	.....175†
Duluth,Minn. A7	.....175†
Fairfield,Ala. T2	.....175†
Houston,Tex. S5	.....180†
Johnstown,Pa. B2	.....179*
Joliet,Ill. A7	.....175†
KansasCity,Mo. S5	.....180†
Kokomo,Ind. C16	.....177†
Minnequa,Colo. C10	...180**
Monessen,Pa. P7	.....178††
Pittsburg,Calif. C11	...195†
Rankin,Pa. A7	.....175†
S.Chicago,Ill. R2	.....175**
S.SanFrancisco C10	...195**
SparrowsPoint,Md. B2	..181*
Sterling,Ill.(1) N15	...179††

WOVEN Fence, 9-15 ga. — Col.

Ala.City,Ala. R2	....162**
Ala.City, 17 ga. R2	...257**
Ala.City, 18 ga. R2	...267**
Aliq'ppa,Pa.9-14½ga J5	165‡
Atlanta A11	168
Bartonville,Ill. K4	168
Crawfordsville,Ind. M8	..168
Donora,Pa. A7	.....162†
Duluth,Minn. A7	.....162†
Fairfield,Ala. T2	.....162†
Houston,Tex. S5	.....167†
Johnstown,Pa.(43) B2	...166
Joliet,Ill. A7	.....162†
KansasCity,Mo. S5	.....167†
Kokomo,Ind. C16	.....164†
Minnequa,Colo. C10	...167**
Monessen,Pa. 9 ga. P17	166††
Pittsburg,Calif. C11	...185†
Rankin,Pa. A7	.....162†
S.Chicago,Ill. R2	.....162**
Sterling,Ill.(1) N15	...164††

	An'ld	Galv.
WIRE (16 Gage)	**Stone**	**Stone**
Ala.City R2	...14.50	16.05**
Bartonville K4	..14.60	16.55
Buffalo W12	....14.50	....
Cleveland A7	....14.50	....
Crawf'dsville M8	14.60	16.55
Fostoria,O. S1	..14.60	16.15†
Johnstown B2	..14.50	16.40*
Kokomo C16	..14.60	16.15†
Minnequa C10	..14.75	16.65**
Palmer,MassW12	14.50	16.05*
Pitts.,Calif. C11	14.85	16.40†
S.Chicago R2	..14.50	16.05**
SparrowsPt. B2	14.60	16.50*
Sterling(1) N15	14.50	16.45††
Waukegan A7	..14.50	16.05†
Worcester A7	...14.80	....

	An'ld	Galv.
WIRE, Merchant Quality	**Stone**	**Stone**
(6 to 8 gage)		
Ala.City,Ala. R2	7.40	7.80**
Aliquippa J5	....7.40	7.925‡
Atlanta A11	.....7.50	8.10
Bartonville(48) K4	7.50	8.10
Buffalo W12	.....7.40	8.80†
Cleveland A7	.....7.40	....
Crawfordsville M8	7.50	8.10
Donora,Pa. A7	...7.40	7.80†
Duluth,Minn. A7	..7.40	7.80†
Fairfield T2	.....7.40	7.80†
Houston,Tex. S5	..7.65	8.05†
Jacks'ville,Fla.M8	7.90	8.475
Johnstown B2(48)	7.40	7.975*
Joliet,Ill. A7	.....7.40	7.80†
KansasCity,Mo. S5	7.65	8.05†
Kokomo C16	.....7.50	7.90†
LosAngeles B3	..8.35	8.925*
Minnequa C10	...7.65	8.05**
Monessen P7(48)	7.40	8.00††
Palmer,Mass. W12	7.70	8.10†
Pitts.,Calif. C11	..8.35	8.75†
Portsmouth,O. P12	7.40	....
Rankin A7	.....7.40	7.80†
S.Chicago R2	....7.40	7.80**
S.SanFran. C10	..8.35	8.75**
Spar'wsPt.B2(48)	7.50	8.075*
Str'ling(1)(48)N15	7.40	8.00††
Struthers,O.(48)Y1	7.40	7.90‡
Worcester,Mass.A7	7.70	....

*Based on 12.50c zinc; †5c zinc; ‡10c zinc; **Subject to zinc equalization extras. ††13c zinc.

FASTENERS

(Base discounts, full case quantity, per cent off list to consumer, f.o.b. mill)

Carriage, Machine Bolts

Full-Size Body (cut thread)	
↑½" x 6" and smaller	61
Larger than ½" diam. and all diams. longer than 6"	55
Under-Size Body (rolled thread; not nutted): ½" x 6" and smaller.	61

↑½" x 4" and smaller and shorter are not nutted.

NUTS

Reg. & Heavy Square Nuts, all sizes	61
H. P. Reg. & Heavy Hex Nuts:	
⅝" & smaller	64
⅞" to 1⅛" incl.	63
1¼" to 1½" incl.	65
1⅝" & larger	61
C.P. Reg. & Heavy Hex Nuts	
¾" & smaller	64
⅞" & larger	61
Semifinished & Finished Nuts	
¾" & smaller	66
⅞" & larger	63
Semifinished Slotted Reg. & Heavy Hex Nuts	
¾" & smaller	66
⅞" & larger	63
Hot Galvanized Nuts, all types	
1½" & smaller	44

(On above items, add 25% for less than case quantities)

CAP SCREWS
(New Std., hexagon head, upset, packages)

Bright:	
6" and shorter:	
¼" through ½" diam.	34
⅝" & ¾" diam.	31
⅞", 1"	8
Longer than 6"	
¼" through ¾" diam.	3
⅞" through 1" diam.	+13
High Carbon, Heat-treated:	
6" and shorter:	
¼" through ½" diam.	20
⅝" & ¾" diam.	16
⅞", 1"	+11
Longer than 6"	
¼" through ¾" diam.	+23
⅞" through 1" diam.	+41

(New Std. Hexagon head, upset, bulk)

Bright:	
¼" x 6" & smaller & shorter	49
⅝" & ¾" diam. x 6" & shorter	48
⅞", 1" x 6" & shorter	31
High Carbon, Heat-treated:	
¼" x 6" & smaller & shorter	41
⅝" x ¾" diam. & 6" & shorter	39
⅞", 1" x 6" & shorter	20

MACHINE SCREW NUTS & STOVE BOLT NUTS (Bulk)

No. 2 to ⅜" incl., Square:	
25,000 to 199,999 pieces	20
200,000 or more pieces	27
No. 2 to ⅜" incl., Hex.:	
25,000 to 199,999 pieces	18
200,000 or more pieces	25

MACHINE SCREWS, SLOTTED (Bulk)

No. 2 to ¼" diam. incl.:	
25,000 to 199,999 pieces	20
200,000 or more pieces	27
⅝" to ½" diam. incl.:	
15,000 to 99,999 pieces	20
100,000 or more	27

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. in.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	21.06	20.42
1¼	13	....	24.94	20.45
1½	13	23.31	27.57	22.61
1¾	13	27.54	32.57	26.71
2	13	30.87	36.51	29.93
2¼	13	34.77	41.12	33.72
2½	12	37.73	44.63	36.60
2¾	12	41.57	49.16	40.31
2¾	12	45.00	53.22	43.65
3	12	47.99	56.76	46.55

RAILWAY MATERIALS

	Standard No. 1	Standard No. 2	Tee Rails All No. 2	Tee Rails 60 lb Under
RAILS				
Bessemer,Pa. U5	4.725	4.625	4.675	5.65
Ensley,Ala. T2	4.725	4.625	....	5.65
Fairfield,Ala. T2	....	....	....	5.65
Gary,Ind. U5	4.725	4.625	4.675	....
Huntington,W.Va. W7	....	....	....	5.65
IndianaHarbor,Ind. I-2	4.725	4.625	4.675	....
Johnstown,Pa. B2	....	....	...(16)	5.65
Lackawanna,N.Y. B2	4.725	4.625	...(18)	5.65
Minnequa,Colo. C10	4.725	4.625	....	6.15
Steelton,Pa. B2	4.725	4.625	....	....
Williamsport,Pa. S19	....	....	....	5.65

TIE PLATES

Fairfield,Ala. T2	.....5.625
Gary,Ind. U5	.....5.625
Ind.Harbor,Ind. I-2	...5.625
Lackawanna,N.Y. B2	..5.625
Minnequa,Colo. C10	...5.625
Seattle B3	.....5.775
Steelton,Pa. B2	.....5.625
Torrance,Calif. C11	...5.775

TRACK BOLTS (20) Treated

Cleveland R2	.....12.90
KansasCity,Mo. S5	....12.40
Lebanon,Pa. B2	.....12.40
Minnequa,Colo. C10	...12.40
Pittsburgh O3, P14	..12.90*
Seattle B3	.....12.90

*0.75 off for untreated

AXLES

Ind.Harbor,Ind. S12	....7.25
Johnstown,Pa. B2	.....7.25

JOINT BARS

Bessemer,Pa. U5	.....5.825
Fairfield,Ala. T2	.....5.825
Ind.Harbor,Ind. I-2	...5.825
Joliet,Ill. U5	.....5.825
Lackawanna,N.Y. B2	..5.825
Minnequa,Colo. C10	...5.825
Steelton,Pa. B2	.....5.825

SCREW SPIKES

Cleveland R2	.....11.90
Pittsburgh O3	.....11.90

STANDARD TRACK SPIKES

Fairfield,Ala. T2	.....7.90
Ind.Harbor, Ind. I-2, Y1	7.90
KansasCity,Mo. S5	....7.90
Lebanon,Pa. B2	.....7.90
Minnequa,Colo. C10	....7.90
Pittsburgh J5	.....7.90
Seattle B3	.....8.40
S.Chicago,Ill. R2	.....7.90
Struthers,O. Y1	.....7.90
Youngstown R2	.....7.90

METAL POWDER

(Per pound f.o.b. shipping point in ton lots for minus 100 mesh, except as otherwise noted)

	Cents
Sponge iron: 98+% Fe, annealed	9.25
Swedish, c.i.f. Camden, N. J., c.l. in bags	9.50
Domestic, f.o.b., Johnstown, Pa., Riverton, N.J., Niagara Falls, N.Y., in bags	9.50
Canadian, f.o.b. Shipping point	9.50
Electrolytic iron:	
Melting stock, 99.9% Fe, irregular fragments of ⅛ in. x 1.3 in.	22.00
Annealed, 99.5% Fe	36.50
Unannealed (99+% Fe)	34.00
Unannealed (99+% Fe) (minus 325 mesh)	57.00
Powder Flakes (minus 16, plus 100 mesh)	31.00
Carbonyl Iron: 97.9-99.8% size 5 to 10 microns	83.00-148.00
Aluminum: Atomized, 500 lb. drum frght. allowed	
Carlots	34.50
Ton lots	36.50
Antimony, 500 lb lots	32.00*
Brass, 5000-lb lots	38.25-52.25†
Bronze, 5000-lb lots	63.75-67.00†
Copper:	
Electrolytic	14.25*
Reduced	14.25*
Lead	7.50*
Manganese:	
Minus 35 mesh	64.00
Minus 100 mesh	70.00
Minus 200 mesh	75.00
Nickel, unannealed	$1.00
Nickel-Silver, 5000-lb lots	59.75-62.50†
Phosphor-Bronze, ¼-ton lots	58.50
Silicon	47.50
Solder	7.00*
Stainless Steel, 302	99.00
Stainless Steel, 316	$1.32
Tin	14.50*
Zinc 5000-lb lots	19.25-33.00‡
Tungsten	Dollars
Melting grade, 99% 60 to 200 mesh:	
1000 lb and over	4.30
Less than 1000 lb	4.45
Chromium, electrolytic 99.2% Cr min.	3.50

*Plus cost of metal. †Depending on composition. ‡Depending on mesh. §70% Cu, 20% Zn, 10% Ni. **64% Cu, 18% Zn, 18% Ni.

Footnotes

(1) Chicago Base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(5) 1¼-in. to less than 1 7/16-in.
(6) Chicago or Birm. base.
(7) To jobbers, 3 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass., base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Gage 0.143 to 0.249 in.; for gage 0.142 and lighter, 5 90c.
(15) ¾" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(20) 0.25 off for untreated.
(21) New Haven, Conn., base.
(22) Deld. San Francisco Bay area.
(24) Deduct 0.10c, finer than 15 Ga.
(25) Bar mill bands.
(26) Delivered in mill zone, 5.25c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Youngstown base.
(30) Sheared; for universal mill and 0.45c for carbon, add 0.40c for alloy and 0.45c H.S.L.A.
(31) Widths over ⅝-in.; 6.90c for widths ⅝-in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) To jobbers, deduct 20c.
(34) 9.60c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) 13 Ga. & heavier; 60" & narrower.
(38) 14 Ga. & lighter; 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.
(41) 9.10c for cut lengths.
(42) Mill lengths, f.o.b. mill; deld. in mill zone or within switching limits, 5.25c.
(43) 9-14½ Ga.
(48) 6-7 Ga.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	6.5	+11.5	10.5	+8.25	13	+5.75	14.5	+4.25	14.5	+4.25	14	+4.75	16.5	+2.25
Ambridge, Pa. N2	6.5	..	10.5	...	13	...	14.5	...	14.5	...	14	...	16.5	...
Lorain, O. N3	6.5	+11.5	10.5	+8.25	13	+5.75	14.5	+4.25	14.5	+4.25	14	+4.75	16.5	+2.25
Youngstown Y1	6.5	+11.5	10.5	+8.25	13	+5.75	14.5	+4.25	14.5	+4.25	14	+4.75	16.5	+2.25

ELECTRIC WELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	6.5	+11.5	10.5	+8.25	13	+5.75	14.5	+4.25	14.5	+4.25	14	+4.75	16.5	+2.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Sizes—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	...	...	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Alton, Ill. L1	...	...	....	....	....	....	15.5	+3.75	18.5	0.25	21	3.75	23.5	5.5
Benwood, W. Va. W10	17.5	+13	7	+18.5	+0.75	+28.5	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Butler, Pa. F6	17.5	+13	9	+18.5	0.5	+27	...	...	...	...	...	...	...	...
Etna, Pa. N2	...	...	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Fairless Hills, Pa. N3	...	...	....	....	....	....	16.5	+2.75	19.5	1.75	22	4.75	24.5	6.5
Fontana, Calif. K1	...	...	....	....	....	....	7	+12.25	10	+8.25	12.5	+4.75	15	+3
Ind. Harbor, Ind. Y1	...	...	....	....	....	....	17.5	+1.75	20.5	2.25	23	5.75	25.5	7.5
Lorain, O. N3	...	...	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Sharon, Pa. S4	17.5	+13	9	+18.5	0.5	+27	...	...	...	...	...	...	...	...
Sharon, Pa. M6	...	...	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Sparrows Pt., Md. B2	15.5	+15	7	+20.5	+1.5	+30	15.5	+3.75	18.5	0.25	21	3.75	23.5	5.5
Youngstown R2, Y1	...	...	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Wheatland, Pa. W9	17.5	+13	9	+18.5	0.5	+27	17.5	+1.75	20.5	2.25	23	5.75	25.5	7.5

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.73		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	27	9.5	27.5	10	29	10.75	29	10.75	....	...	....	...
Alton, Ill. L1	24	6.5	24.5	7	26	7.75	26	7.75	....	...	....	...
Benwood, W. Va. W10	27	9.5	27.5	10	29	10.75	29	10.75	19.5	0.75	19.5	0.75
Etna, Pa. N2	27	9.5	27.5	10	29	10.75	29	10.75	19.5	0.75	19.5	0.75
Fairless Hills, Pa. N3	25	7.5	25.5	8	27	8.75	27	8.75	17.5	+1.25	17.5	+1.25
Fontana, Calif. K1	15.5	+2	16	+1.5	17.5	+0.75	17.5	+0.75	8	+10.75	8	+10.75
Ind. Harbor, Ind. Y1	26	8.5	26.5	9	28	9.75	28	9.75	18.5	+0.25	18.5	+0.25
Lorain, O. N3	27	9.5	27.5	10	29	10.75	29	10.75	....	...	....	...
Sharon, Pa. M6	27	9.5	27.5	10	29	10.75	29	10.75	....	...	....	...
Sparrows Pt., Md. B2	24	6.5	24.5	7	26	7.75	26	7.75	16.5	+2.25	16.5	+2.25
Youngstown R2, Y1	27	9.5	27.5	10	29	10.75	29	10.75	19.5	0.75	19.5	0.75
Wheatland, Pa. W9	26	8.5	26.5	9	28	9.75	28	9.75	18.5	+0.25	18.5	+0.25

*Galvanized pipe discounts based on current price of zinc (13.50c, East St. Louis).

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	Rerolling: Slabs	Rerolling: Ingot	Forging Billets	Seamless Tube Billets	H.R. Strip	Wire Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	18.50	23.00	....	....	31.00	....	....	....	42.25	39.00
202	19.75	25.50	31.00	36.25	33.50	....	36.75	38.75	42.50	42.50
301	19.25	23.75	....	36.75	32.00	36.00	38.00	....	44.25	41.00
302	20.50	26.25	32.00	37.25	34.50	36.25	38.25	40.25	44.50	44.50
302B	20.25	26.50	33.00	37.25	37.75	36.25	38.25	40.25	47.00	47.00
303	....	26.75	34.75	40.00	....	39.00	41.00	....	....	....
304	21.75	27.50	33.75	39.00	37.25	38.25	40.25	43.00	47.25	47.25
304L	....	....	38.75	44.00	42.25	43.25	45.25	48.00	52.25	52.25
305	23.25	30.25	....	39.50	40.25	38.25	40.25	43.50	50.25	50.25
308	23.50	30.50	38.50	44.25	41.25	43.25	45.50	49.75	52.00	52.00
309	31.00	39.75	46.75	53.50	53.50	52.00	54.75	58.25	67.00	67.00
310	37.25	48.00	62.25	72.25	68.50	69.75	73.50	75.25	78.75	78.75
314	....	....	....	....	....	69.75	....	75.25	....	....
316	31.50	40.25	51.25	59.50	58.25	57.75	60.75	64.00	68.25	68.25
316L	....	....	....	56.25	64.50	63.25	62.75	65.75	69.00	73.25	73.25
317	37.25	48.25	62.75	72.75	73.50	70.75	74.50	77.00	83.75	83.75
321	25.00	32.00	38.25	44.00	44.25	43.00	45.25	49.25	54.25	54.25
18-8CbTa	29.25	38.00	45.75	52.25	53.25	50.75	53.50	58.00	66.50	66.50
403	....	....	28.75	32.75	....	32.25	34.00	36.25	....	....
405	17.50	23.00	26.75	31.00	32.25	30.50	32.00	33.75	42.25	42.25
410	15.00	19.50	25.50	29.50	28.00	29.00	30.50	31.75	36.25	36.25
416	....	....	26.00	30.00	....	29.50	31.00	....	....	....
420	....	30.25	31.00	36.00	37.75	35.50	37.25	40.75	56.00	56.00
430	15.25	19.75	26.00	30.00	28.75	29.50	31.00	32.25	36.75	36.75
430F	....	....	26.50	30.50	....	30.00	31.50	....	....	....
431	....	25.50	33.25	....	....	37.25	39.25	40.75	....	....
446	....	....	35.50	40.50	53.25	40.00	42.00	43.25	63.25	63.25

Stainless Steel Producers Are: Allegheny Ludlum Steel Corp.; Alloy Metal Wire Co. Inc.; Alloy Tube Div., Carpenter Steel Co.; American Steel & Wire Div., U. S. Steel Corp.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; G. O. Carlson Inc.; Carpenter Steel Co.; Charter Wire Products Co.; Cold Metal Products Co.; Crucible Steel Co. of America; Damascus Tube Co.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Ellwood Ivins Steel Tube Works Inc.; Firth Sterling Inc.; Ft. Wayne Metals Inc.; Globe Steel Tubes Co.; Helical Tube Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Joslyn Mfg. & Supply Co.; Kenmore Metals Corp.; Maryland Fine & Specialty Wire Co.; McLouth Steel Corp.; Metal Forming Corp.; McInnes Steel Co.; National-Standard Co.; National Tube Div., U. S. Steel Corp.; Newman-Crosby Steel Co.; Pacific Tube Co.; Page Steel & Tube Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Rodney Metals Inc.; Rome Mfg. Co.; Rotary Electric Steel Co.; Sharon Steel Corp.; Sawhill Tubular Products Inc.; Simonds Saw & Steel Co., Specialty Wire Co. Inc.; Spencer Wire Corp.; Stainless Welded Products Inc.; Standard Tube Co.; Superior Steel Corp.; Superior Tube Co.; Timken Roller Bearing Co.; Trent Tube Co.; Tube Methods Inc.; Ulbrich Stainless Steels; United States Steel Corp.; Universal-Cyclops Steel Co.; Wallingford Steel Co.; Washington Steel Corp.

Clad Steel

	Plates: 10% Carbon Base	Plates: 20% Carbon Base	Sheets 20% Carbon Base
Stainless:			
302	....	....	30.50
304	30.30	36.05	32.50
304-L	32.30	37.95	....
310	41.30	47.00	....
316	35.80	41.40	47.00
316-L	40.00	46.10	....
316-CB	41.15	48.45	....
321	32.00	37.75	37.25
347	34.40	41.40	48.25
405	25.80	33.35	....
410	25.30	32.55	....
430	25.30	32.55	....
Inconel	49.45	65.45	....
Nickel	41.05	55.55	....
Nickel, Low Carbon	43.25	60.05	....
Monel	42.35	56.35	....
Copper*	....	....	46.00

	Strip, Carbon Base—Cold Rolled: 10%	Strip, Carbon Base—Cold Rolled: Both Sides
Copper*	30.00	38.00

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22, Coatesville, Pa. L7, New Castle, Ind. I-4 and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Regular Carbon	0.275	5%Cr Hot Work	0.430-0.460
Extra Carbon	0.330	W-Cr Hot Work	0.450
Special Carbon	0.390	V-Cr Hot Work	0.470
Oil Hardening	0.430	Hi-Carbon-Cr	0.770

Grade by Analysis (%)

W	Cr	V	Co	Mo	$ per lb
20.25	4.25	1.6	12.25	...	4.090
18.25	4.25	1	4.75	...	2.305-2.475
18	4	2	9	...	2.675-2.6775
18	4	2	....	...	1.765
18	4	1	....	...	1.600
13.75	3.75	2	5	...	2.245
13.5	4	3	....	...	1.865
9	3.5	..	....	...	1.180
6	4	2	....	5	1.165
6	4	3	....	6	1.350
1.5	4	1	....	8.5	0.960

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, J3, M14, S8, U4, V2 and V3.

Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate and do not include 3% federal tax.

Birmingham District	Basic	No. 2 Foundry	Malle-able	Besse-mer
AlabamaCity,Ala. R2	54.50	55.00‡	....	....
Birmingham R2	54.50	55.00‡	....	....
Birmingham U6	....	55.00‡	59.00	....
Woodward,Ala. W15	54.50	55.00‡	59.00	....
Cincinnati, deld.	....	62.70	....	....
Buffalo District				
Buffalo H1, R2	58.50	59.00	59.50	60.00
Tonawanda,N.Y. W12	58.50	59.00	59.50	60.00
N.Tonawanda,N.Y. T9	....	59.00	59.50	60.00
Boston, deld.	69.15	69.65	70.15	....
Rochester,N.Y. deld.	61.52	62.02	62.52	....
Syracuse,N.Y. deld.	62.62	63.12	63.62	....
Chicago District				
Chicago I-3	58.50	59.00	59.00	59.50
Gary,Ind. U5	58.50	....	59.00	....
S.Chicago R2	58.50	....	59.00	....
S.Chicago,Ill. Y1	58.50	59.00	59.00	59.50
S.Chicago,Ill. U5, W14	58.50	....	59.00	59.50
Milwaukee, deld.	60.67	61.17	61.17	61.67
Muskegon,Mich. deld.	....	65.30	65.30	....
Cleveland District				
Cleveland A7, R2	58.50	59.00	59.00	59.50
Akron,O., deld.	61.25	61.75	61.75	62.25
Lorain,O. N3	58.50	....	....	59.50
Mid-Atlantic District				
Bethlehem,Pa. B2	60.50	61.00	61.50	62.00
NewYork, deld.	....	64.78	65.28	....
Newark, deld.	63.52	64.02	64.52	65.02
Birdsboro,Pa. B10	60.50	61.00	61.50	62.00
Chester,Pa. P14	60.50	61.00	61.50	....
Philadelphia, deld.	62.16	62.66	63.16	....
Steelton,Pa. B2	60.50	61.00	61.50	62.00
Swedeland,Pa. A3	60.50	61.00	61.50	62.00
Philadelphia, deld.	62.16	62.66	63.16	63.66
Troy,N.Y. R2	60.50	61.00	61.50	62.00
Pittsburgh District				
NevilleIsland,Pa. P6	58.50	59.00	59.00	....
Pittsburgh (N&S sides), Aliquippa, deld.	....	60.37	60.37	60.87
McKeesRocks, deld.	....	60.04	60.04	60.54
Lawrenceville,Homestead, Wilmerding, Monaca, deld.	....	60.66	60.66	61.16
Verona,Trafford, deld.	60.69	61.19	61.19	61.69
Brackenridge, deld.	60.95	61.45	61.45	61.95
Bessemer,Pa. U5	58.50	....	59.00	59.50
Clairton,Rankin,S.Duquesne,Pa. U5	58.50	....	....	....
McKeesport,Pa. N3	58.50	....	....	59.50
Midland,Pa. C18	58.50	....	....	....

Youngstown District	Basic	No. 2 Foundry	Malle-able	Besse-mer
Hubbard,O. Y1	....	....	59.00	....
Sharpsville,Pa. S6	58.50	....	59.00	59.50
Youngstown Y1	....	....	59.00	59.50
Youngstown U5	58.50	....	....	59.50
Mansfield,O., deld.	63.40	....	63.90	64.40
Duluth I-3	58.50	59.00	59.00	59.50
Erie,Pa. I-3	58.50	59.00	59.00	59.50
Everett,Mass. E1	62.00	62.50	63.00	....
Fontana,Calif. K1	64.50	65.00	....	....
Geneva,Utah C11	58.50	59.00	....	....
GraniteCity,Ill. G4	60.40	60.90	61.40	....
Ironton,Utah C11	58.50	59.00	....	....
LoneStar,Texas L6	....	55.00*	....	....
Minnequa,Colo. C10	60.50	61.00	61.50	....
Rockwood,Tenn. T3	....	55.00‡	59.00	....
Toledo,O. I-3	58.50	59.00	59.00	59.50
Cincinnati, deld.	64.26	64.76	....	....

*Phos. 0.51-0.75%; $56, Phos. 0.31-0.50%.
‡Intermediate (Phos. 0.31-0.69%), $56.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos iron on which base is 1.75-2.00%.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1% or portion thereof.

Nickel: Under 0.05% no extra; 0.50-0.74%, inclusive, add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1.25 for each 0.5% Si; 75 cents for each 0.50% Mn over 1%)

Jackson,O. G2, J1	$67.50
Buffalo H1	68.75

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

NiagaraFalls, N.Y. P15	$91.00
Keokuk,Iowa, (Open-hearth & Fdry, freight allowed K2)	95.50
Keokuk, O.H. & Fdry, 12¼ lb piglets, 16% Si, frgt allowed K2	98.50

LOW PHOSPHORUS PIG IRON, Gross Ton

Lyles,Tenn. T3 (Phos. 0.035% max)	$72.50
Rockwood,Tenn. T3 (Phos. 0.0035% max)	72.50
Steelton,Pa. B2 (Phos. 0.035% max)	66.50
Philadelphia, deld.	70.05
Troy,N.Y. R2 (Phos. 0.035% max)	66.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	63.50
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	63.50
Erie,Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max)	63.50
Pittsburgh P6 (Intermediate) (Phos. 0.036-0.075% max)	63.50

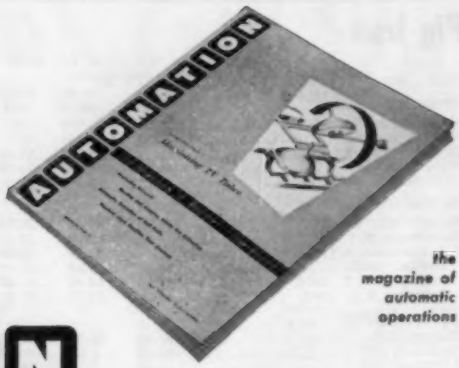
Warehouse Steel Products

Representative prices, per pound, subject to extras, f.o.b. warehouse. City delivery charges are 25 cents per 100 lb except: Erie, 30 cents; Moline, Norfolk, Richmond, Washington, 20 cents; Birmingham, Buffalo, Chicago, Chattanooga, Cincinnati, Cleveland, Jackson, Milwaukee, St. Louis, 15 cents; Baltimore, Boston, Los Angeles, Philadelphia, Portland, San Francisco, 10 cents; Atlanta, Houston, Seattle, Spokane, New York, no charge.

	SHEETS				STRIP		BARS			Standard Structural Shapes	PLATES	
	Hot-Rolled	Cold-Rolled	Gal. 10 Ga.†	Stainless Type 302	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.‖	H.R. Alloy 4140††‖		Carbon	Floor
Atlanta	7.14	8.20	8.87	....	7.40	...	7.42	9.39	....	7.63	7.49	9.48
Baltimore	7.08	8.32	8.37	....	7.65	...	7.66	8.62[3]	13.44	7.93	7.21	8.87
Birmingham	6.80	7.90	8.85	....	7.06	...	7.08	9.35	....	7.28	6.99	9.10
Boston	7.70	8.81	10.27	45.67	7.96	...	7.83	9.53	14.45	8.13	7.89	9.36
Buffalo	7.00	8.05	9.77	....	7.30	...	7.30	7.90	13.10	7.55	7.30	8.55
Chattanooga	6.95	8.10	8.80	....	7.20	...	7.20	9.18	....	7.45	7.25	9.05
Chicago	7.00	8.24	8.65	49.05	7.21	...	7.27	7.75	12.85	7.43	7.14	8.61
Cincinnati	7.12	8.23	9.05	46.10	7.45	...	7.51	8.05	13.09	7.90	7.43	8.86
Cleveland	7.00	8.24	8.95	49.16	7.31	...	7.33	7.85	12.91	7.76	7.31	8.78
Detroit	6.99	8.28	8.78	43.50	7.34	...	7.36	8.04	13.05	7.75	7.27	8.65
Erie, Pa.	6.80	7.90	8.85	....	7.15	...	7.08	7.85	....	7.40	7.15	8.63
Houston	7.85	8.75	10.49	....	8.15	...	8.25	9.85	14.00	8.20	7.80	9.20
Jackson, Miss.	7.10	8.20	9.20	....	7.40	...	7.40	9.44	....	7.60	7.45	9.30
Los Angeles	8.05	10.00	11.00	....	8.35	...	8.05	10.70	14.25	8.30	8.05	10.25
Milwaukee	7.09	8.33	8.74	....	7.30	...	7.36	7.94	12.94	7.60	7.23	8.70
Moline, Ill.	7.15	8.44	8.85	....	7.41	...	7.43	8.10	....	7.63	7.34	....
New York	7.71	8.94	9.64	44.95	8.27	...	8.21	9.68	13.28	8.19	7.96	9.39
Norfolk, Va.	7.25	...	...	....	7.65	...	7.65	9.50	....	7.95	7.45	8.95
Philadelphia	7.19	8.42	9.35	45.98	7.67	9.02	7.68	8.46	13.16	7.74	7.37	8.69**
Pittsburgh	6.80	8.00	9.20	49.00	7.16	...	7.08	7.85	12.85	7.28	6.99	8.46
Portland, Oreg.	7.80	8.80	10.65	....	8.00	...	7.95	12.20	15.00	7.85	7.75	9.60
Richmond, Va.	7.00	...	9.47	....	7.65	...	7.70	8.85	....	7.95	7.20	9.10
St. Louis	7.29	8.53	9.34	43.89	7.50	...	7.56	8.14	13.14	7.83	7.43	8.90
St. Paul	7.46	8.59	9.16	....	7.72	...	7.74	8.51	13.51	7.94	7.65	9.12
San Francisco	8.10	9.65	10.15	51.65	8.35	...	8.00	11.20	14.25[3]	8.25	8.05	10.25
Seattle	8.55	10.40	10.80	54.00	8.65	...	8.40	11.70	14.65	8.30	8.20	10.10
Spokane	8.55	11.00[1]	10.80	....	9.05	...	8.35	11.80	15.35	8.30	8.20	10.60
Washington	7.50	8.79	7.97	....	8.12	...	8.06	9.09	....	8.40	7.68	9.34

Prices do not include gage extras; †prices include gage and coating extras (based on 12.50-cent zinc), except in Birmingham (coating extra excluded); ‡includes 35-cent special bar quality extras; **¼-in. and heavier; ††as annealed; ‡‡under ½-in.

Base quantities, 2000 to 4999 lb except as noted; Cold-rolled strip and cold-finished bars, 2000 lb and over except in Seattle, 2000 to 9999 lb, and in Los Angeles, 6000 lb and over; stainless sheets, 6000 lb except in Chicago, New York and Boston, 10,000 lb, and in San Francisco, 2000 to 4999 lb; hot-rolled products on West Coast, 2000 to 9999 lb; [3]—500 to 9999 lb; [4]—400 to 999 lb; [5]—4000 lb and over; [6]—1000 to 1999 lb; [7]—1000 lb and over; [1]—1500 to 3999 lb; [2]—2000 to 3999 lb; *—f.o.b. local delivery in lots of 10,000 lb and over.



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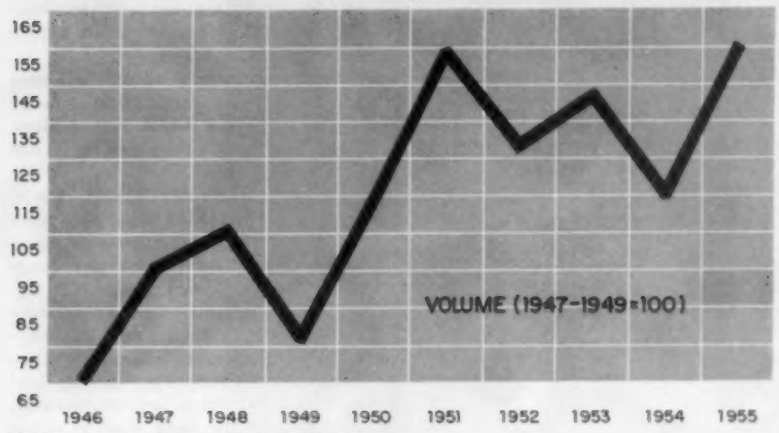
Bolt and Nut Industry Hits Peak in '55*



*Estimates by Russell, Burdsall & Ward Bolt & Nut Co.

Fastener Makers Optimistic

BOLT AND NUT makers have just completed the best year in the industry's history (see chart), and they're looking forward to another production record in 1956.

Harry O. McCully, vice president in charge of sales, Russell, Burdsall & Ward Bolt & Nut Co., Fort Chester, N. Y., says production of industrial fasteners in 1955 shot 35 per cent higher than it was in 1954, explaining: "Demand has been running modestly ahead of the mills' ability to deliver, and our incoming orders topped shipments nearly every month in the second half." With this situation carrying over into the new year, Mr. McCully says: "A 5-per-cent volume increase in the first half of 1956 appears to be a reasonable prospect."

Not Alone—Officials of Republic Steel Corp.'s Bolt & Nut Division in Cleveland agree that 1956 will be a whale of a year. They believe that there won't be much difference in over-all tonnage, but the product mix will show a big change. General manufacturing use of fasteners will not show any big peaks up or down this year, they believe. Some drop-off is expected in smaller sizes, but fasteners for machinery and heavy construction will fill the gap.

James G. Rayburn, general sales manager of Lamson & Sessions Co., Cleveland, says his company is running full schedules and probably will for the next few months. Much will depend on the pace of automotive production, but if motordom comes up with 7 million or more cars this year, as President Harlow H. Curtice of GM predicts, there will be little fall-off in demand from that source. Mr. Rayburn feels that heavier fasteners will fill in if automakers falter. "So far," says one major producer, "we have had no cutbacks from Detroit."

Heavy on Heavies—At the turn of 1956, deliveries of fasteners ranged from stock (immediate) to three months or more, says RB&W's Mr. McCully. "Finished nuts and certain small screw products are scarce . . . High-strength bolts for construction and heavy industry are one of the fastest expanding products we manufacture." Another producer of high-strength bolts says it is somewhat disappointed at the progress in this line because of building code barriers. But the company is convinced this is one of its best bets for beefing up production schedules in the future. The same producer says: "The outlook for our big mine bolts looks better than ever."

Raw materials will have much to say about the level of operations in 1956 as they did in 1955. Despite remarkable sales gains in the year, the industry could have done even better last year if raw materials had been in greater supply, said Mr. McCully. And the increases in both base price and extras for steel had their influence on industrial fasteners. The pattern will not change much in 1956, many industry spokesmen feel.

Efficiency Drive—There is some expansion going on in the industry to meet the increased demand. For instance, RB&W has spent more than $1 million each year since World War II in expansion and modernization programs, according to Mr. McCully. But much of the increased production is coming from greater efficiency in operations. Lamson & Sessions is building two new plants—one in Brooklyn, O., and the other in Bedford Park, Ill.—to replace present facilities elsewhere. More efficient layout and operation of the facilities will enable the company to increase its production, although capacity as such will not be expanded greatly.

Stainless Steel . . .

Stainless Steel Prices, Page 112

U. S. Steel Corp. issued a new mill price schedule for stainless steel and a new extra book on that commodity Jan. 14. The mill price lists include increased prices for 416Se (selenium-bearing stainless); 431 and rerolling slabs and ingots.

Corporation officials said the increase in 416Se was a direct result of higher prices of selenium. Other producers of type 431 had been charging a higher price than that listed by the corporation, and U. S. Steel's changes were forced by difficulty of manufacturing that type. It's a minor grade, tonnagewise, say corporation officials, and hard to make.

The new extra book replaced one dated Aug. 24, 1955. It included new extras for continuous line marking made necessary by government specifications. The book revised cold-finished bar and wire extras and includes a new section on extruded odd or irregular shapes.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 109 & 110

"There's no weakness in the heart of sheet sales, but some falling-off is taking place around the fringes." That's how the vice president of a Pittsburgh producer sums up the sheet market.

Declines in such automotive ordering as long ternes for gasoline tanks are probably receiving more publicity than they deserve. Only a small percentage of cold-finished sheet orders have been set back. The net result will be reduction in carryover from the first to the second quarter.

Declines result as the automotive industries move back to a five-day week. Demand remains heavy, and there are many metal fabricators telephoning and telegraphing steel company headquarters to ask for any

Ores

Lake Superior Iron Ore

(Prices effective for the 1956 shipping season, gross ton, 51.50% iron natural, rail of vessel, lower lake ports)

Old range bessemer	$11.25
Old range nonbessemer	11.10
Mesabi bessemer	11.10
Mesabi nonbessemer	10.95
Open-hearth lump	12.10

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

Foundry and basic 52-62% concentrates contract	17.00-18.00

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60-68%	20.00
N. African hematite (spot)	nom. 18.00-20.00
Brazilian iron ore, 68-69% (spot)	26.00-28.00

Tungsten Ore

Net ton unit, before duty

Foreign, wolframite, good commercial quality	$33.75-$34.25
Domestic, scheelite, mine	63.00

Manganese Ore

Mn 48%, nearby, $1.06-$1.11 per long ton unit, c.i.f. U. S. ports, duty for buyer's account; 46-47%, 95c-$1.00.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for deliver to Portland, Oreg., Tacoma, Wash.

Indian and African

48% 2.8:1	nom. $45.00-$50.00
48% 3:1	42.00-44.00
48% no ratio	34.00

South African Transvaal

44% no ratio	$19.00-$20.00
48% no ratio	33.00-35.00

Domestic

Rail nearest seller

18% 3:1	$39.00

Molybdenum

Sulphide concentrate, per lb of Mo content, mines, unpacked	$1.00

Antimony Ore

Per unit of Sb content, c.i.f. seaboard

55-60%	$3.60-$3.85
60-65%	3.85-4.00

Vanadium Ore

Cents per lb V_2O_5 content, deld. mills

Domestic	31.00

Refractories

Fire Clay Brick (per 1000)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haldeman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parral, Portsmouth, O., Ottawa, Ill., Stevens Pottery, Ga., $122; Salina, Pa., $127; Niles, O., $133.

Super-Duty: St. Louis, $150.

Silica Brick (per 1000)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Portsmouth, O., Hawstone, Pa., $128; Warren, Niles, O., Hays, Pa., $133; Morrisville, Pa., $131.50; E. Chicago, Ind., Joliet, Rockdale, Ill., $138; Lehigh, Utah, $144; Los Angeles, $151.

Super Duty: Hays, Sproul, Hawstone, Pa., Warren, Windham, O., Athens, Tex., $145; Morrisville, Pa., Niles, O., $148; Joliet, Ill., $151; Curtner, Calif., $163.

Semisilica Brick (per 1000)

Clearfield, Pa., $139; Philadelphia, $124; Woodbridge, N. J., $122.

Ladle Brick (per 1000)

Dry Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Mexico, Vandalia, Mo., $88.50; Wellsville, O., $92.50; Clearfield, Pa., Portsmouth, O., $98.

High-Alumina Brick (per 1000)

50 Per Cent: St. Louis, Mexico, Mo., $194; Danville, Ill., $197; Philadelphia, Clearfield, Pa., $201.

60 Per Cent: St. Louis, Mexico, Vandalia, Mo., $241; Danville, Ill., $244; Philadelphia, Clearfield, Pa. $248.

70 Per Cent: St. Louis, Mexico, Vandalia, Mo., $279; Danville, Ill., $281; Clearfield, Pa., Philadelphia, $286.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., $157; Clearfield, Pa., $158.50; St. Louis, $169.30.

Nozzles (per 1000)

Reesdale, Pa., $253.70; Johnstown, Pa., $259.20; Clearfield, Pa., $259.40; St. Louis, $259.45; Bridgeburg, Pa., $258.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., $196; Clearfield, Pa., $198; St. Louis, $195.80.

Dolomite (per net ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, O., Gibsonburg, Narlo, O., $15; Thornton, McCook, Ill., $15.60; Dolly Siding, Bonne Terre, Mo., $14.

Magnesite (per net ton)

Domestic, dead-burned, bulk, ⅛-in. grains with fines: Chewelah, Wash., $40; Luning, Nev., $40. ⅜-in. grains with fines: Baltimore, $66.40.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connelsville, furnace	$13.75-14.50
Connellsville, foundry	16.00-17.00

Oven Foundry Coke

Birmingham, ovens	$25.65
Cincinnati, deld.	30.58
Buffalo, ovens	27.50
Buffalo, deld.	28.75
Camden, N. J., ovens	26.50
Chicago, ovens	27.00
Cincinnati, deld.	28.50
Detroit, ovens	27.50
Detroit, deld.	28.50
Pontiac, deld.	29.06
Saginaw, deld.	30.58
Erie, Pa., ovens	27.50
Everett, Mass., ovens	
New England, deld.	*28.55
Indianapolis, ovens	26.75
Kearny, N. J., ovens	26.75
Lone Star, Tex., ovens	19.50
Milwaukee, ovens	27.50
Neville Island, (Pittsburgh) Pa., ovens	26.25
Painesville, O., ovens	27.50
Cleveland, deld.	29.43
Philadelphia, ovens	26.50
Portsmouth, O., ovens	24.75
Cincinnati, deld.	27.34
St. Paul, ovens	26.50
Swedeland, Pa., ovens	26.50
Terre Haute, Ind., ovens	26.75

*Or within $4.55 freight zone from works.

Coal Chemicals

Spot, cents per gallon, ovens

Pure benzene	36.00
Toluene, one deg.	32.00-34.00
Industrial xylene	32.00-35.00

Per ton, bulk, ovens

Ammonium sulphate	$42-$45
Birmingham area	42.00†

†With port equalization against imports.

Cents per pound, producing point

Phenol: Grade 1, 15.00; Grade 2-3, 14.50; Grade 4, 16.50; Grade 5, 15.25.

Fluorspar

Metallurgical grades, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $38-$39; 70%, $35-$36; 60%, $31-$32. Imported, net tons, f.o.b. cars point of entry, duty paid, metallurgical grade: European, $34; Mexican, $26.50.

Electrodes

Threaded with nipple, unboxed, f.o.b. plant

GRAPHITE

Diam (Inches)	Length	Per 100 lb
2	24	$52.50
2½	30	33.75
3	40	32.00
4	40	30.25
5½	40	30.00
6	60	27.25
7	60	26.75
8, 9, 10	60	24.25
12	72	27.25
14	60	23.50
16	72	22.50
17	60	23.00
18	72	22.50
20	72	22.25

CARBON

8	60	12.10
10	60	11.80
12	60	11.75
14	60	11.70
14	72	10.85
17	60	10.75
17	72	10.35
20	84	10.30
20	90	10.10
24	72, 84	10.30
24	90	10.05
30	84	10.20
40, 35	110	9.90
40	100	9.90

additional tonnage resulting from automotive cutbacks. That additional tonnage hasn't materialized and probably won't amount to much before third quarter.

Strip fabricators would welcome any decrease in the terrific demand for that product which would allow them to satisfy consumers' demands more adequately.

Beginning with silicon, high-tensile, alloys and specialties, sheet producers are booking second-quarter tonnage earlier than they did for any quarter in the last year or so.

Tank and railroad demand is strong and pressing. Such firms are buying through second quarter, if they can. Oil field people say drilling projects are due for a notable increase, and demand for tank steel is rising accordingly.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 108

Inland Steel Co. has announced new extras covering rail steel bars, shapes and bands, effective Jan. 11. Among the changes are an increase in length extras of 10 cents per 100 lb in lengths of 10 feet and over, and some modifications in size extras. The latter on rail steel reinforcing bars are up 5 cents per 100 lb on sizes 8 through 11.

Rolling mill order backlogs in the Pacific Northwest are reported fair, new awards just about equalling production. Much new business is reported pending. Many sizable projects are expected out for bids soon. Bids have been called by the Bureau of Reclamation for the Wahluke siphon job, involving 7000 tons of reinforcing. Bids are scheduled for Mar. 1 for the interstate Columbia river bridge which will require 1150 tons of bars.

Steel Bars . . .

Bar Prices, Page 108

Some hot-rolled bar mills plan to open their books for second quarter business by the end of this month. Cold-drawn barmakers, in most cases, already are accepting tonnage orders for delivery beyond March as they have not been under the heavy pressure for shipments experienced by the hot mills.

Most producers will likely open second quarter books on a month-to-month basis so as to keep delivery promises in balance with schedules.

Pressure for shipment of delinquent tonnage is strong but buying appears to be less feverish. Hot-rolled carbon bar schedules are filled through March, New England sellers report, though some additional ton-

(*Please turn to page* 120)

HARLLEE BRANCH, JR. *Portrait by Fabian Bachrach*

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First results of the industry campaign are now coming in. Gulf Power Company has reached 87.3% employee participation... Utah Power and Light employees have enrolled 69.6% . . . Wisconsin Electric Power reports 69.8% . . . Wisconsin-Michigan Power Company, 62% . . . Wisconsin Public Service, 57.6% . . . Lake Superior District Power, 52%.

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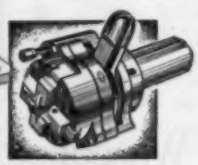

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Standard Ferromanganese: (Mn 74-76%, C 7% approx.) Base price per net ton $205. Duquesne, Johnstown, Sheridan, Pa.; Philo, O.; Tacoma, Wash.; Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively.

(Mn 79-81%). Lump $213 per net ton, f.o.b. Anaconda or Great Falls, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

Low-Carbon Ferromanganese, Regular Grade: (Mn 85-90%). Carload, lump, bulk, max. 0.07% C, 30.95c per lb of contained Mn, carload packed 32c, ton lots 33.5c, less ton 34.7c. Delivered. Deduct 1.5c for max 0.15% C grade from above prices, 3c for max 0.30% C, 3.5c for max 0.50% C, and 6.5c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk 22.35c per lb of contained Mn, packed, carload 23.4c, ton lot 25c, less ton 26.2c. Delivered. Spot, add 0.25c.

Manganese Metal: 2" x D (Mn 95.5% min, Fe 2% max, Si 1% max, C 0.2% max): Carload, lump, bulk, 45c per lb of metal; packed, 45.75c; ton lot 47.25c; less ton lots 49.25c. Delivered. Spot, add 2c.

Electrolytic Manganese Metal: Min carload, 30c; 2000 lb to min carload, 32c; 250 lb to 1999 lb, 34c. Premium for hydrogen-removed metal, 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or to any point east of Mississippi; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk 1.50% C grade, 18-20% Si, 11.5c per lb of alloy. Packed, c.l. 12.5c, ton 12.95c, less ton 13.95c, f.o.b. Alloy, W. Va., Ashtabula, O., Marietta, O., Sheffield, Ala., Portland, Oreg. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. For 3% C grade, Si 12-14.5%, deduct 0.4c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lots 2" x D, $1.50 per lb of contained Ti; less ton $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lots $1.35, less ton $1.37 f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $200 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4.5%). Contract $225 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l., lump, bulk 26.25c per lb of contained Cr; c.l. packed 27.5c, ton lot 29.25c, less ton 30.65c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-71%). Contract, carload, lump, bulk, C 0.025% max (Simplex) 31.75c per lb contained Cr, 0.02 max 38.50c, 0.03% max 38c, 0.06% max 36.50c, 0.1% max 36c, 0.15% max 35.75c, 0.2% max 35.50c, 0.5% max 35.25c, 1.0% max 34c, 1.5% max 33.85c, 2.0% max 33.75c. Ton lot, add 3.1c, less ton add 4.8c. Carload packed add 1.45c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). Contract, c.l. 8 M x D, bulk 27.4c per lb contained Cr. Packed, c.l. 28.7c, ton 30.5c, less ton 32c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, Low-Carbon: (Cr 50-54%, Si 28-32%, C 1.25% max). Contract, carload, packed 8 M x D, 19.6c per lb of alloy, ton lot 20.85c; less ton lot, 22.05c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome-Silicon: (Cr 34-41%, Si 42-49%, C 0.05% max). Contract, carload, lump, 4" x down and 2" x down, bulk, 39.05c per lb of contained Cr; 1" x down, bulk 39.8c. Delivered.

Chromium Metal, Electrolytic: Commercial grade (Cr 99.2% min, Fe 0.2 max). Contract, carlot, packed 2" x D plate (about ⅛" thick) $1.25 per lb, ton lots $1.27, less ton lots $1.28. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open-hearth Grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.10 per lb of contained V. Delivered. Spot, add 10c. **Special Grade** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.20. **High Speed Grade** (V 50-55%, or 70-75%, Si 1.50% max, C 0.20% max) $3.30.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 6, 68c; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lots, packed, $1.33 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

25-30% Ferrosilicon: Contract, carload, lump, bulk, 20.9c per lb of contained Si. Packed 21.40c; ton lot 22.50c f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 12.75c per lb of contained Si. Packed, c.l. 14.85c, ton lot 16.3c, less ton 17.95c. F.o.b. Alloy, W. Va., Ashtabula, O., Marietta, O., Sheffield, Ala., and Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.2c to 50% ferrosilicon prices.

65% Ferrosilicon: Contract, carload, lump, bulk, 14.5c per pound contained silicon. Packed, c.l. 16.2c, ton lots, 18c; less ton, 19.35c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Contract, carload, lump, bulk, 15.4c per lb of contained Si. Packed, c.l. 17.05c, ton lot 18.7c, less ton 19.95c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Contract, carload, lump, bulk, 18.5c per lb of contained Si. Packed, c.l. 19.95c, ton lot 21.35c, less ton 22.4c. Delivered. Spot, add 0.25c.

Silicon Metal: (Min. 98% Si, 0.75% max Fe, 0.07 max Ca). C.l. lump, bulk, 20.5c per lb of Si. Packed, c.l. 21.95c, ton lot 23.25c, less ton 24.25c. Add 0.5c for max 0.03 Ca grade. Deduct 0.5c for max 2% Fe grade analyzing min 96.5% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 10.65c per lb of alloy, ton lots packed 11.8c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l. lump, bulk 8.5c, per lb of alloy. Packed, c.l. 9.5c, ton lot 10.65c, less ton 11.5c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Contract, carload, lump, packed 26.25c per lb of alloy, ton lot 27.4c, less ton 28.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices, 100 lb and over, are as follows: Grade A (10-14% B) 85c per pound; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). $5.25 per lb contained B, delivered to destination.

Bortam: (B 1.5%-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 1 to 2%). Contract, lump, carloads 9.5bc per lb, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Contract, carload, lump, bulk 22c per lb of alloy, carload packed 23.05c, ton lot 24.95c, less ton 25.95c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Contract, carload, lump, bulk 21.5c per lb of alloy, carload packed 22.95c, ton lot 25.25c, less ton 26.75c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx. 3¾ lb each and containing exactly 2 lb of Cr). Contract, carload, bulk, 16.95c per lb of briquet, carload packed in box pallets 17.15c, in bags 17.85c; 3000 lb to c.l. in box pallets 18.35c; 2000 lb to c.l. in bags, 19.05c; less than 2000 lb in bags 19.95c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Contract, carload, bulk 12.5c per lb of briquet, c.l. packed, pallets 12.7c, bags 13.5c; 3000 lb to c.l., pallets 13.9c; 2000 lb to c.l., bags, 14.7c, less ton 15.6c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 13.15c per lb of briquet, c.l. packed, pallets, 13.35c; bags 14.15c, 3000 lb to c.l., pallets, 14.55c; 2000 lb to c.l., bags, 15.35c; less ton 16.25c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si). Contract, carload, bulk 7.15c per lb of briquet; packed, pallets, 7.35c; bags, 8.15c; 3000 lb to c.l., pallets, 8.95c; 2000 lb to c.l. bags 9.75c; less ton 10.65c. Delivered. Spot, add 0.25c.

(Small size—Weighing approx. 2½ lb and containing exactly 1 lb of Si). Carload, bulk 7.3c. Packed, pallets 7.5c; bags 8.34c; 3000 lb to c.l. pallets 9.1c; 2000 to c.l. bags 9.9c; less ton 10.8c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) $1.33 per pound of Mo contained, f.o.b. Langeloth, Pa.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%), 5000 lb W or more $3.30 per lb of contained W; 2000 lb W to 5000 lb W, $3.40; less than 2000 lb W, $3.52. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 8% max, C 0.4% max). Contract, ton lot, 2" x D, $6.90 per lb of contained Cb. Delivered. Spot, add 10c.

Ferrotantalum—Columbium: (Cb 40% approx., Ta 20% approx., and Cb plus Ta 60% min C 0.30% max). Ton lots, 2" x D, $4.65 per lb of contained Cb plus Ta, delivered; less ton lots $4.70.

Silicaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8%, Zr 3-5%, Ti 9-11%, B 0.55-0.75%). Carload packed 1" x D, 45c per lb of alloy, ton lot 47c, less ton 49c. Delivered.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.) Contract, c.l. packed ½ in. x 12 M, 18.5c per lb of alloy, ton lots 19.65c, less ton 20.9c. Delivered. Spot, add 0.25c.

Graphidex No. 5: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 18.5c per lb of alloy, ton lots 19.65c; less ton lots 20.9c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 17.2c per lb of alloy; ton lots 18.7c; less ton lots 19.95c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Siminal: (Approx. 20% each Si, Mn, Al; bal. Fe). Lump, carload, bulk 17.50c. Packed c.l. 18.50c, 200 lb to c.l. 19.50c, less than 2000 lb 20c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $4 for each 1% of P above or below the base; carload, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $90 per gross ton.

Ferromolybdenum: (55-75%). Per lb contained Mo, in 200-lb containers, f.o.b. Langeloth, Pa., $1.54 in all sizes except powdered which is $1.66; Washington, Pa., furnace, any quantity $1.46.

Technical Molybdic-Oxide: Per lb contained Mo, f.o.b. Langeloth, Pa.; $1.31 in cans; in bags, $1.30, f.o.b. Langeloth, Pa.; $1.24, Washington, Pa.

(*Concluded from page* 116)

nage is available for March delivery. This reflects progress in reducing mill carryovers.

Cold-drawn stock in standard sizes and grades can be ordered for March shipment, in a few cases, for late February. Hot-topped grades are more extended; also leaded free-machining stock, deliveries on which extend through April, as a general thing.

Semifinished Steel . . .

Semifinished Prices, Page 108

Bethlehem Pacific Coast Steel Corp. forecasts a continued full rate of steel operations this year. Bethlehem officials say they expect to operate through the first half of the year at rates as high as 110 per cent of capacity. The company's three western mills produced 900,000 tons of ingots last year.

Plates . .

Plate Prices, Page 108

One leading eastern plate producer is expected to open second quarter books shortly. Most mills, in fact, are thought likely to take action around Feb. 10, or shortly thereafter. Most of them will have less carryover at the end of this quarter than was the case at the close of fourth quarter last year. Few, however, expect to be in complete balance on commitments.

The mills continue under heavy pressure for shipments from the railroads and carbuilders, to say nothing of demand from fabricators of tank and line pipe and manufacturers of heavy industrial and electrical equipment.

The Pennsylvania Railroad has an 11,200 freight car program scheduled for its own shops, as noted in a recent issue, and is pushing hard for steel. Some car shops are closing down temporarily due to lack of steel, particularly plates.

While some inquiries are thought to be inflated, New England plate fabricators are able to place firm orders for only part of their requirements, unless rated tonnage is involved. Large needs of unscheduled inquiries have accumulated for which there is no capacity open before second quarter. This includes substantial light gage volume for tanks.

Most New England shops' inventories are low and this fact has been attracting gray market tonnage offerings at premium prices, 10.00 cents per lb., f.o.b. a Pennsylvania shipping point.

Demand for clad plates is being maintained with deliveries about eight weeks extended. Heads can be shipped in seven to eight weeks, some from stock, depending on size.

The scarcity of plates on the Pacific Coast is giving Pacific Northwest fabricators trouble in bidding on new work. Considerable tonnage for fuel storage facilities at Alaskan military bases is before the market.

Wire . . .

Wire Prices, Pages 110 & 111

Except for a slight easing in pressure from the automotive industry, demand is heavy, notably for manufacturers wire grades. First quarter mill schedules are filled, merchant products and nails excepted.

A substantial volume of business has been booked for second quarter but is not yet scheduled. In many cases, where finished products are affected by cutbacks, wire orders stand up. Low inventories and expected price advances around midyear keep most wire tonnage on order books.

U. S. Steel Export Co. raised the price of galvanized plain wire to $8.12 per 100 lb to reflect the recent increase in the price of zinc.

Connecticut closes Jan. 30 on 22,500 linear feet of 2-cable guide railing and close to 500 tons of reinforcing mat fabric for its turnpike.

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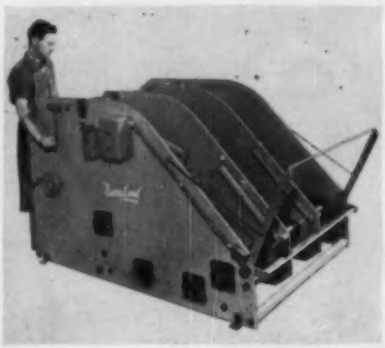

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Scrap . . .

Scrap Prices, Page 122

Pittsburgh—No. 1 heavy melting prices have risen too far and too fast, say purchasers and some brokers here. Auto production cutbacks have led to uncertainty over steel requirements, and this doubt is extending into the scrap market.

Higher prices on the No. 1 grades have stimulated the flow of tonnage. Local steel mills, however, are not greatly interested. The higher prices prevailing in the Valley district have had little effect on the market here.

Railroad grades rose early this month.

Chicago—Activity in scrap trading is light, with important consumers refraining from purchasing and broker-dealer negotiations pared down correspondingly. Pricewise, important grades of scrap are unchanged. Some observers term the market weak—based on offers to dealers which are $1 to $2 a ton down from a week or two ago. Meanwhile, steelmaking operations are maintained at only a shade under capacity.

Boston—Soft spots in brokers' buying prices indicate the recent sharp advance in steel scrap has sputtered. An embargo on Boston dock shipments contributes to the reaction. Also, automotive cutbacks in the steel market are felt psychologically. No. 2 steel, including bundles, is in short supply, lending some strength to that grade.

New York—The iron and steel scrap market is active, with brisk export business supplementing domestic orders. Brokers' buying prices are strong, but unchanged at the higher levels established a week ago.

Buffalo—Sustained strength at recently advanced prices rules the local scrap market. Prices are considered more in line with those in other steelmaking centers. Dealers, anticipate even further advances, though no sizable new buying is noted.

Cleveland—In the absence of representative new sales, the scrap market in this area is quiet, with prices unchanged. Market sentiment is softer, and brokers' buying prices are reported $2 per ton lower. Not much in the way of activity is looked for until the closing week of the month when new automotive lists will come out.

Philadelphia—Major grades of open-hearth steel scrap are unchanged, but short shovel turnings have advanced to $40.50, delivered, and couplers, springs and wheels to $61. Cupola cast is stronger at $52-$53, delivered, and malleable is exceedingly strong at $68.

Export tonnage is moving well, with clearances from this port in December approximating 39,000 net tons, and a substantial tonnage is scheduled to leave this month. At least four ships will be loaded here in January.

Youngstown—U. S. Steel Corp. is reported to have bought some No. 2 heavy melting steel at $49, up $2 from the previous sales; also some No. 2 bundles at $45, up $1.

Cincinnati—Prices are easier here. Some brokers look for the softer tone to prevail until next month. Softening in prices is not helped by reports that automakers have cut back on their steel requirements.

Detroit—There's a slightly softer tone in the scrap market here this week but it hasn't been translated into lower prices. While automakers have cut back on their steel requirements no immediate changes are expected in scrap demand. Less scrap will be available from the auto plants.

St. Louis—The steady rise in scrap prices, capped by a $2 advance made by the two major mills early this month, caused a lot of metal to start moving. As a result, there has been a decline in prices—ranging from $2 to $3 on heavy melting, bundles and some cast iron grades. The market situation, despite the slump in prices, remains healthy with little speculating in evidence. Laclede Steel now is taking in scrap from outside areas, but it is not paying the freight differential.

Birmingham—Steel scrap is showing signs of weakness. Dealers are willing to sell at present prices but consumers are unwilling to buy. There has been a noticeable easing of supplies in the Atlanta area where dealers were apparently holding material for higher prices. Cast iron prices are unchanged despite an increase in dealers' supplies.

Los Angeles—Collections have been accelerated with scrap inventories wilting under heavy pressure from mills. Auto wrecking continues as the area's primary source of scrap.

San Francisco—With the mills working at capacity, demand for scrap remains unabated. One large producer in the area is operating at 117 per cent of capacity.

Seattle—Scrap prices are steady. Dealers see no signs of a break with local prices in line with those in other domestic markets.

Exports are heavy on old commitments. There is less inquiry from Japan, buyers there protesting the high prices quoted on this side. Four cargoes, totaling 28,000 tons, were shipped from Portland to Japan in December and another 5000 tons have since been dispatched.

Pig Iron . . .

Pig Iron Prices, Page 113

Trade speculation on higher pig iron prices continues. There may be an increase soon, although some believe action will be delayed until the freight rate situation is clarified.

Railroads propose a 7-per-cent increase on all commodities in all sections of the country, effective Feb. 25. Shippers are expected to file any exceptions Feb. 3. Replies to exceptions are to be made by the railroads Feb. 10. Cross-examination of witnesses by each side follows on Feb. 13.

Oral arguments of both groups will be heard by the Interstate Commerce Commission Feb. 20. That body will come to some decision before the close of the working day on Feb. 24.

So far as can be learned, no opposition to the railroad's proposal is contemplated by the steel producing industry.

Merchant pig iron business has recovered from the year-end lull. Prospects are that bookings will continue heavy for some time to come, possibly at least through May.

There is some balancing out of inventory going on, with some found-

(*Please turn to page* 124)

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Iron and Steel Scrap

Consumer prices, per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Jan. 18	$53.33
Jan. 11	53.33
Dec. Avg.	50.37
Jan. 1955	34.95
Jan. 1951	46.33

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting..	54.00-55.00
No. 2 heavy melting..	48.00-49.00
No. 1 bundles	54.00-55.00
No. 2 bundles	44.00-45.00
No. 1 busheling	54.00-55.00
Machine shop turnings	*36.00-37.00*
Mixed borings, turnings	*36.00-37.00*
Short shovel turnings..	39.00-40.00
Cast iron borings	39.00-40.00
Cut structurals, 3 ft lengths	59.00-60.00
Heavy turnings	46.00-47.00
Punchings & plate scrap	59.00-60.00
Electric furnace bundles	54.00-55.00

Cast Iron Grades

No. 1 cupola	*48.00-49.00*
Charging box cast	*45.00-46.00*
Heavy breakable cast	*45.00-46.00*
Unstripped motor blocks	32.00-33.00
No. 1 machinery cast..	54.00-55.00

Railroad Scrap

No. 1 R.R. heavy melt.	*59.00-60.00*
Rails, 2 ft and under	*68.00-69.00*
Rails, 18 in. and under	*69.00-70.00*
Rails, random lengths	*64.00-65.00*
Railroad specialties	*63.00-64.00*

Stainless Steel Scrap

18-8 bundles & solids	*340.00-355.00*
18-8 turnings	*225.00-235.00*
430 bundles & solids	*110.00-120.00*
430 turnings	60.00-65.00

CLEVELAND

No. 1 heavy melting..	54.00-55.00
No. 2 heavy melting..	45.00-46.00
No. 1 bundles	54.00-55.00
No. 2 bundles	42.00-43.00
No. 2 busheling	54.00-55.00
Machine shop turning.	30.00-31.00
Mixed borings, turnings	34.50-35.50
Short shovel turnings..	34.50-35.50
Cast iron borings	34.50-35.50
Low phos.	55.00-56.00
Cut structural plates 2 ft and under	61.00-62.00
Alloy free, short shovel turnings	37.00-38.00
Electric furnace bundles	55.00-56.00

Cast Iron Grades

No. 1 cupola	56.00-57.00
Charging box cast	48.00-49.00
Stove plate	54.00-55.00
Heavy breakable cast..	47.00-48.00
Unstripped motor blocks	38.00-39.00
Brake shoes	43.00-44.00
Clean auto cast	55.00-56.00
Burnt cast	43.00-44.00
Drop broken machinery	56.00-57.00

Railroad Scrap

No. 1 R.R. heavy melt.	55.00-56.00
R.R. malleable	59.00-60.00
Rails, 2 ft and under..	71.00-72.00
Rails, 18 in. and under	72.00-73.00
Rails, random lengths..	65.00-66.00
Cast steel	60.00-61.00
Railroad specialties	60.00-61.00
Uncut tires	60.00-61.00
Angles, splice bars	66.00-67.00
Rails, rerolling	71.00-72.00

Stainless Steel

(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids..	340.00-350.00
18-8 turnings	200.00-210.00
430 clips, bundles, solids	105.00-115.00
430 turnings	55.00-65.00

YOUNGSTOWN

No. 1 heavy melting	*57.00-58.00*
No. 2 heavy melting..	48.00-49.00
No. 1 bundles	57.00-58.00
No. 2 bundles	44.00-45.00
No. 1 busheling	57.00-58.00
Machine shop turnings	32.50-33.50
Short shovel turnings.	36.50-37.50
Cast iron borings	36.50-37.50
Low phos.	59.00-60.00
Electric furnace bundles	59.00-60.00

Railroad Scrap

No. 1 R.R. heavy melt.	57.00-58.00

CHICAGO

No. 1 heavy melting..	49.00-52.00
No. 2 heavy melting..	40.00-41.00
No. 1 dealer bundles..	50.00-51.00
No. 1 factory bundles..	52.00-53.00
No. 2 bundles	40.00-41.00
No. 1 busheling	49.00-52.00
Machine shop turnings.	31.00-32.00
Mixed borings, turnings	33.00-34.00
Short shovel turnings..	33.00-34.00
Cast iron borings	33.00-34.00
Cut structurals, 3 ft..	56.00-57.00
Punchings & plate scrap	57.00-58.00

Cast Iron Grades

No. 1 cupola	51.00-52.00
Stove plate	43.00-44.00
Unstripped motor blocks	40.00-41.00
Clean auto cast	56.00-57.00
Drop broken machinery	56.00-57.00

Railroad Scrap

No. 1 R.R. heavy melt.	*53.00-54.00*
R.R. malleable	64.00-65.00
Rails, 2 ft and under..	69.00-70.00
Rails, 18 in. and under	70.00-71.00
Angles, splice bars	67.00-68.00
Rails, rerolling	72.00-73.00

Stainless Steel Scrap

18-8 bundles & solids	335.00-350.00
18-8 turnings	240.00-250.00
430 bundles & solids	110.00-115.00
430 turnings	50.00-55.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*49.00*
No. 2 heavy melting	*36.00*
No. 1 bundles	*49.00*
No. 2 bundles	36.00
No. 1 busheling	*49.00*
Machine shop turnings.	23.00
Mixed borings, turnings	23.00
Short shovel turnings..	27.00
Punchings & plate scrap	55.00

Cast Iron Grades

No. 1 cupola	43.00
Charging box cast	37.00
Stove plate	37.00
Heavy breakable	35.00
Unstripped motor blocks	25.00
Clean auto cast	46.00
Malleable	42.00

BIRMINGHAM

No. 1 heavy melting..	45.00-46.00
No. 2 heavy melting..	42.00-43.00
No. 1 bundles	45.00-46.00
No. 2 bundles	34.00-35.00
No. 1 busheling	45.00-46.00
Cast iron borings	19.00-20.00
Short shovel turnings..	30.00-31.00
Machine shop turnings.	29.00-30.00
Electric furnace bundles	48.00-49.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	47.50-48.00
Stove plate	44.50-45.50
Bar crops and plate	54.00-55.00
Structural & plate, 2 ft	54.00-55.00
Unstripped motor blocks	39.00-40.00
Charging box cast	32.00-33.00
No. 1 wheel	39.00-40.00

Railroad Scrap

No. 1 R.R. heavy melt.	51.00-52.00
Rails, 18-in. and under	64.00-65.00
Rails, rerolling	64.00-65.00
Rails, random lengths..	59.00-60.00
Angles, splice bars	61.00-62.00

PHILADELPHIA

No. 1 heavy melting...	55.00
No. 2 heavy melting...	49.00
No. 1 bundles	55.00
No. 2 bundles	46.00
No. 1 busheling	55.00
Electric furnace bundles	56.00
Machine shop turnings.	38.00
Mixed borings, turnings	38.00
Short shovel turnings	*40.50*
Heavy turnings	51.00
Structurals & plate	58.00-60.00
Couplers, springs, wheels	*61.00*
Rail crops, 2 ft & under	67.00

Cast Iron Grades

No. 1 cupola	*52.00-53.00*
Malleable	*68.00*
Heavy breakable cast..	54.00
Drop broken machinery	57.00-58.00

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting..	49.00-50.00
No. 2 heavy melting..	46.00-47.00
No. 1 bundles	49.00-50.00
No. 2 bundles	40.00-42.00
Machine shop turnings	29.00-30.00
Mixed borings, turnings	30.00-31.00
Short shovel turnings..	32.00-33.00
Low phos. (structural & plate)	50.00-52.00

Cast Iron Grades

No. 1 cupola	47.00-48.00
Unstripped motor blocks	32.00-33.00
Heavy breakable	46.00-47.00

Stainless Steel

18-8 sheets, clips solids	320.00-325.00
18-8 borings, turnings..	150.00-160.00
430 sheets, clips, solids	120.00-125.00
410 sheets, clips, solids	100.00-105.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*46.50-47.00*
No. 2 heavy melting	*41.50-42.00*
No. 1 bundles	*46.50-47.00*
No. 2 bundles	*39.50-40.00*
Machine shop turnings	*28.50-29.00*
Mixed borings, turnings	*29.50-30.00*
Short shovel turnings	*30.50-31.00*
No. 1 cast	45.00-45.50
Mixed cupola cast	42.00-42.50
No. 1 machinery cast..	47.00-47.50

BUFFALO

No. 1 heavy melting..	47.00-48.00
No. 2 heavy melting..	43.00-44.00
No. 1 bundles	47.00-48.00
No. 2 bundles	40.00-41.00
No. 1 busheling	47.00-48.00
Mixed borings, turnings	33.00-34.00
Machine shop turnings	31.00-32.00
Short shovel turnings.	35.00-36.00
Cast iron borings	35.00-36.00
Low phos.	49.00-50.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	47.00-48.00
No. 1 machinery	50.00-51.00

Railroad Scrap

Rails, random lengths.	58.00-59.00
Rails, 3 ft and under.	60.00-61.00
Railroad specialties	51.00-52.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*47.00-48.00*
No. 2 heavy melting	*41.00-42.00*
No. 1 bundles	*47.00-48.00*
No. 2 bundles	*39.00-40.00*
No. 1 busheling	*47.00-48.00*
Machine shop turnings	*30.50-31.50*
Mixed borings, turnings	30.00-31.00
Short shovel turnings	*31.50-32.00*
Cast iron borings	30.00-31.00
Low phos., 18 in.	*56.00-57.00*

Cast Iron Grades

No. 1 cupola	*46.00-47.00*
Heavy breakable cast	*44.00-45.00*
Charging box cast	*44.00-45.00*
Drop broken machinery	*55.00-56.00*

Railroad Scrap

No. 1 R.R. heavy melt.	55.00-56.00
Rails, 18 in. and under	*67.00-68.00*
Rails, random lengths	*60.00-61.00*

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	*41.50*
No. 2 heavy melting	*39.00*
No. 1 bundles	*41.50*
No. 2 bundles	*35.00*
Machine shop turnings	28.00
Short shovel turnings..	28.00

Cast Iron Grades

No. 1 cupola	47.00
Charging box cast	*42.00*
Heavy breakable cast	*40.00*
Unstripped motor blocks	*40.00*
Brake shoes	44.00
Clean auto cast	48.00
Stove plate	41.00

Railroad Scrap

No. 1 R.R. heavy melt.	55.50
Rails, 18 in. and under	67.00
Rails, random lengths.	65.00
Rails, rerolling	71.00
Angles, splice bars	*61.50*

SEATTLE

No. 1 heavy melting..	48.00
No. 2 heavy melting..	44.00
No. 1 bundles	40.00
No. 2 bundles	38.00
No. 3 bundles	25.00
Machine shop turnings.	15.00-16.00
Mixed borings, turnings	15.00-16.00
Short shovel turnings..	15.00-16.00
Electric furnace, No. 1	55.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	50.00
Heavy breakable cast..	40.00
No. 1 wheels	35.00
Unstripped motor blocks	33.00
Clean motor blocks	40.00
Stove plate (f.o.b. plant)	35.00
Brake shoes	35.00

Railroad Scrap

Rails, random lengths..	33.00

LOS ANGELES

No. 1 heavy melting..	39.00
No. 2 heavy melting..	37.00
No. 1 bundles	39.00
No. 2 bundles	33.00
Machine shop turnings.	18.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	48.00

SAN FRANCISCO

No. 1 heavy melting..	44.00
No. 2 heavy melting..	42.00
No. 1 bundles	44.00
No. 2 bundles	38.00
No. 1 busheling	44.00
Machine shop turnings	23.00
Mixed borings, turnings	23.00
Cast iron borings	23.00
Short shovel turnings.	25.00
Cut structurals	46.00
Heavy turnings	25.00
Punchings & plate scrap	44.00

Cast Iron Grades

No. 1 cupola	50.00
Charging box cast	35.00
Stove plate	39.00
Heavy breakable cast..	36.00
Unstripped motor blocks	32.00
Brake shoes	35.00
Clean auto cast	50.00
No. 1 wheels	39.00
Burnt cast	23.00
Drop broken machinery	50.00

HAMILTON, ONT.

No. 1 heavy melting	*45.50*
No. 2 heavy melting	*41.50*
No. 1 bundles	*45.50*
No. 2 bundles	*38.00*
Mixed steel scrap	*38.00*
Mixed borings, turnings	*19.00*
Rails, remelting	*54.50*
Busheling, new factory:	
Prepared	*43.50*
Unprepared	*39.50*
Short steel turnings	*27.50*

Cast Iron Grades†

No. 1 machinery cast..	42.00-45.00

†F.o.b., shipping point.

GREAT MOMENTS IN THE HISTORY OF IRON AND STEEL MAKING

Sir Henry Bessemer

Bessemer Converters in use about eighty years ago . . .
This is the twelfth in a series of outstanding inventions and developments that have contributed to the progress of the iron and steel industry.

1856
Bessemer Converter

So far as historians are concerned, the steel period began in 1856 with the adoption of the Bessemer process. While modern day scientists identify it as the Bessemer process, it was not the invention of one man. William Kelly, who will be introduced later in this series, is actually credited with the first principle of the pneumatic process.

The original idea of the converter was not to make steel directly but to convert cast iron into wrought iron, then into steel. Bessemer succeeded in producing steel by developing a pneumatic process of refining by blowing air through the molten iron. The success of the process depended on stopping the air blast before all the carbon was eliminated from the metal or on adding the necessary carbon to the metal after it was blown.

However, ironmasters who first used the process experienced both success and failure. The difference was in the composition of ores, a defection that was later corrected after proper chemical analysis.

Today, the most selective grades of scrap help produce America's finest steel. These special steels require scrap of known analysis. We believe our experience, personnel, equipment, and the strategic location of our offices can best help you solve any problem you may have in iron or steel scrap.

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LEADERS IN IRON AND STEEL SCRAP SINCE 1889

(*Concluded from page* 121)
ries discovering that shipping schedules previously arranged may be a little overambitious.

For the first time since April, 1949, all 28 of U. S. Steel Corp.'s Monongahela valley blast furnaces are in operation. No. 5 blast furnace at the Duquesne Works was returned to production Jan. 10 after relining. U. S. Steel officials point out that all stacks are operated only in periods of extreme need for pig iron.

The number of active blast furnaces in the Chicago district has risen to 42. Only one is inactive.

The Mystic Iron Works furnace at Everett, Mass., down since late December, will be out of blast six or seven months. A complete new shell will be installed, as well as a complete lining. Inventory at Everett is substantial and well balanced in specifications. Although on reduced draft, Mystic built up a stockpile.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 116

Wilputte Coke Oven Division, Allied Chemical & Dye Corp., has a contract for a battery of 78 underjet coke ovens and auxiliary coal chemical recovery equipment to be installed at the Great Lakes Steel Corp., Detroit. The ovens will more than double present coke plant facilities. When in operation, the new battery will process 3800 tons of coal daily, producing 2800 tons of coke.

Shipments of foundry coke will be lighter in January than in December although over-all volume continues high. Some jobbing foundries in the Chicago area that serve the automotive industry are not as busy as they have been. Coke inventories are good, and it is a matter of balancing consumption with receipts.

Tin Plate . . .

Tin Plate Prices, Page 110

Shipments of metal cans in November of 254,808 tons brought the cumulative total for the first 11 months of 1955 to 4,216,694 tons, compared with 3,859,943 tons in the corresponding period of 1954, according to the Bureau of Census. The November tonnage reflected a seasonal drop from 501,455 tons shipped in October and was off somewhat from 273,616 in November, 1954.

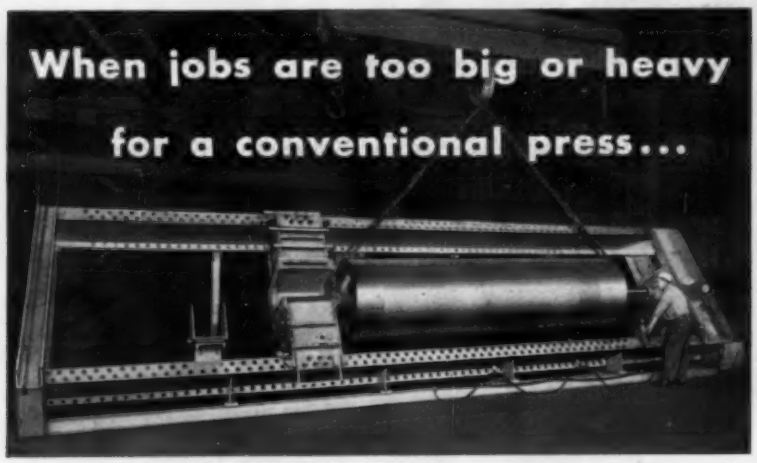
Movement of cans for the fruit and vegetable pack in the 11 months totaled 1,432,985 tons against 1,276,971 tons in the same period of 1954. Beer cans, the second largest classification, accounted for 679,655 tons, compared with 600,572 in the same period the preceding year. Most classifications held some edge over the year before. Exceptions included fish, seafood and soft drinks.

Shipments of steel shipping barrels and drums in November totaled 2,968,188 units, 1 per cent below the October total and 11 per cent above shipments in November, 1954. Shipments of 6,080,826 units of steel shipping packages, kegs and pails in November were 11 per cent below the October movement of 6,798,157 units, and compared with 5,120,832 units in November, 1954.

Shipments of both classifications during the first 11 months ran ahead of the preceding year. Steel shipping barrels totaled 33,133,481 units, compared with 29,858,637 units in 1954. Movement of steel shipping packages, kegs and pails totaled 71,958,639 units against 64,662,092 units in the same period of 1954.

Tin plate producers are entertaining top demand. Some mills doubt consumers' needs can be entirely filled this year. Canmakers, who see expanding requirements for containers, will take all that can be shipped to them. They feel they can take no chances of inadequate inventories at midyear when food packs rise.

Interruption of tin plate shipments



THE DAKE HORIZONTAL INCLINED PRESS is recommended for work on jobs that are so big or heavy that it is more convenient to do press work while they remain suspended from an overhead crane or hoist.

For instance in the illustration above, a 7-inch shaft is being pressed into the cable drum for a 200-ton overhead traveling crane. The drum is 17 feet long and 4 feet in diameter, and is supported on a crane hook.

This particular press (Model 32-100) is 33 feet long overall, and has a daylight opening of 25 feet. It has 300 tons capacity, a 60° inclined frame, 26-inch stroke, and a ram-to-table distance from 25 inches to 25 feet. The table is moved along the frame with a hand winch.

Dake Hydraulic Presses are engineered to meet such a variety of shop requirements that the engineering is probably almost done on the press you need. Let us quote.

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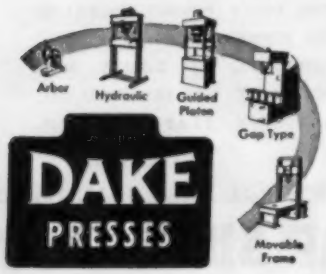

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due to a possible steel strike at mid-year would be serious. Consequently, the canmakers are building their inventories and the mills are shipping in increasingly larger tonnage.

Warehouse . . .

Warehouse Prices, Page 113

Distributors report brisk demand for all major products.

In the Philadelphia district, they are analyzing mill changes in extras on alloy steel and cold-finished carbon bars, following upward revisions on hot-rolled sheets and hot-rolled bars.

Sales are off slightly in the New England district, having failed to rebound to the pre-holiday rate. In the case of structurals and plates, this is due to lack of adequate stocks.

Galvanized sheet bookings are slow in some eastern areas where stocks are substantial, tending to weaken the price structure. Cold-finished sheets also are slower.

Shipments of overdue tonnage to warehouses are heavier. Prospects have improved for an increase in receipts from the mills in the second quarter. The exceptions are plate and structurals. Shipments to the automotive industry in that period are expected to be smaller, releasing more for distributors or other mill customers.

Distributors in the Los Angeles district fear that an unexpected surge in demand will create a shortage of wide-flange beams. Other products are in good supply.

Structural Shapes . . .

Structural Shape Prices, Page 108

While structural steel producers are able to adhere more closely to delivery promises on standard sections, fabricators say that the mills are still running noticeably behind on shipments of the larger standard sections, such as the 28-in. mill sizes. Some makers are at least a month in arrears.

Deliveries of wide flange sections lag about as badly as ever. Some improvement in supply is expected this spring as new facilities get into production. Supplies, nevertheless, will continue stringent for months.

A tremendous amount of construction work is seen ahead. Contracts are on the light side at present, not unusual for this season. Inquiry is reported rising.

One of the larger jobs ahead in the East is a 16-story building for the Chase Manhattan Bank on a plot bounded by Liberty, William, Nassau and Pine streets, New York. Turner Construction Co. has the contract, exclusive of foundations. Schoolwork is becoming more active with recent awards in the New York area headed by 2000 tons for a municipal high school in Manhattan for the printing trades.

Fabricated structural steel contracts are slightly ahead of last year in New England. Awards involving 100 tons or more last year totaled 165,000 tons. Bridge tonnage, notably in Connecticut, leads. A major problem of area fabricators is a shortage of plain material, notably wide flange sections.

Tubular Goods . . .

Tubular Goods Prices, Page 112

Galvanized pipe discounts were revised downward last week to reflect the rise in zinc prices above 13 cents per lb.

U. S. Steel Export Co. lowered discounts on American standard, buttweld and seamless galvanized pipe to reflect the recent increase in the price of zinc.

Buttweld pipe buying is reported picking up at some points, notably in New England where distributors report more activity. For some weeks volume has been slack with yearend inventories substantial in some directions.

Seamless pipe deliveries are the most extended of the tubular goods. Substantial carryover on 10-in. and under is likely going into second quarter. Nickel-bearing stainless tubing also is in tight supply.

Mechanical and pressure tubing demand is slightly improved, shipments running seven to eight weeks. Buttweld is available in three to four weeks.

Inquiry for cast iron pipe is improving. Sales representatives say there is every indication 1956 will be a volume sales year, possibly the equal of that experienced in 1955.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

2000 tons, municipal high school for the printing trade, Manhattan, New York, to Lehigh Structural Steel Co., Allentown, Pa.

1440 tons, five nose wing hangars, Elmendorf Air Base, Alaska, to Bethlehem Pacific Coast Steel Corp., Seattle; Baker-Ford Co., Bellingham, Wash., general contractor at $5,418,110.

1335 tons, seven grade crossings and Mill river bridge, Connecticut turnpike, Fairfield, Conn., Project 309-01, to Bethlehem Steel Co., Bethlehem, Pa.; Poirier & McLane Corp., New York, general contractor.

1000 tons, state bridge, Berks county, Pa., through G. A. & F. C. Wagman, Dallastown, Pa., general contractor, to Lehigh Structural Steel Co., Allentown, Pa.

850 tons, junior high school No. 204, Queens, N. Y., to Lehigh Structural Steel Co., Allentown, Pa.

550 tons, public school No. 58, Brooklyn, N. Y., to Lehigh Structural Steel Co., Allentown, Pa.

325 tons, public school No. 262, Brooklyn, N. Y., to Lehigh Structural Steel Co., Allentown, Pa.

200 tons, school building, West Hartford.

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Furnaces & Plating Equipment
Complete—Like New
Immediate Delivery.

G.E. ROLLER HEARTH 465 KW, 1650 deg. F, 5' wide, 18" high, 20' long & 40' cooling.

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G.E. PUSHER 240 KW, 1650 deg. F, 4' wide, 12" high, 22' long, quench conveyor.

4000 CFH. EXO GEN. w/each above furn.

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SURF. COMB. GAS BOX, 30" wide, 18" high, 36" long, 1500 deg. F.

SURF. COMB. GAS BOX, 4' 6" wide, 12' long, 30" high, 1850 deg. F.

2,000 ft. Mechanical Handling System No. 458 Chain with trolley & clevice assemblies.

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STEEL FOR SALE

Wide plates. Alloy and Carbon steel bars in Hot and Cold rolled grade. Galv. and Black pipe. Send for list.

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PRESS BRAKE

Two-year old, excellent condition, 300-ton Pacific Hydraulic Press Brake with 16 ft. die bed, 14 ft. 2 in. between housing. Capacity 5/16 in. x 16 ft. or ⅝ in. x 12 ft. on 3 in. Vee die opening. Contact Mr. Garfinkel, STAINLESS WELDED PRODUCTS, INC., CLIFTON, NEW JERSEY, PRescott 8-3000.

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1—PAYOFF REEL, WITH DRAG BRAKE OR EQUIVALENT, MANUAL OR POWER, FOR 16" I.D. COILS, 36" O.D. MAXIMUM, 1200 LB. MAXIMUM COIL SIZE.

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REPUTABLE WELL ESTABLISHED STEEL JOBBERS IN PHILADELPHIA, PA. SEEK GENERAL MANAGER. GOOD SALARY AND FUTURE. OUR EMPLOYEES KNOW OF THIS AD. WRITE BOX 362, STEEL, PENTON BUILDING, CLEVELAND 13, OHIO.

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All classifications other than "Positions Wanted," set solid, 50 words or less $15.00, each additional word .30; all capitals, 50 words or less $19.20, each additional word .38; all capitals leaded, 50 words or less $23.40, each additional word .47. "Positions Wanted" set solid, 25 words or less $3.60, each additional word .14; all capitals, 25 words or less $4.50, each additional word .18; all capitals leaded, 25 words or less $5.40, each additional word .22. Keyed address takes seven words. Cash with order necessary on "Positions Wanted" advertisements. Replies forwarded without charge. Displayed classified rates on request. Address your copy and instructions to STEEL, Penton Building, Cleveland 13, Ohio.

Conn., to Kilpatrick Iron Works, Machester, Conn.; Frechette & Flaryan Inc., Hartford, Conn., general contractor; reinforcing to Scherer Steel Co., Hartford.

100 tons, commercial building-parking facilities, Lincoln-Beach streets, Boston, to Bethlehem Steel Co., Bethlehem, Pa.; Coleman Bros. Corp., Boston, general contractor.

STRUCTURAL STEEL PENDING

8000 tons, Ft. Pitt bridge superstructure, a state project, Pittsburgh; American Bridge Division, U. S. Steel Corp., Pittsburgh, is low bidder.

5500 tons, interstate bridge, Columbia river; bids to Oregon Highway Commission, Portland, Oreg., Mar. 1, $14 million, joint venture.

685 tons, five grade structures, Connecticut turnpike, Orange-West Haven, Project 315-02; John Arborio Inc., Poughkeepsie, N. Y., general contractor; also 525 tons, reinforcing bars.

135 tons, including bars, state bridge, New Bedford-Freetown, Mass.; Thomas Bros. Corp., Middleboro, Mass., general contractor.

130 tons, bars and structurals, state bridge, Orange, Mass.; bids Jan. 24, Boston.

118 tons, including reinforcing, but not 11,500 tierods; cofferdam Ice Harbor power project, Snake river; bids to U. S. Engineer, Walla Walla, Wash., Feb. 16.

100 tons, 60-ton traveling crane for Rosa power plant, Washington state; Cyclops Iron Works, San Francisco, apparently low at $47,600.

Unstated, 685-ft Oregon state highway bridge, Snake river; bids to Portland, Oreg., Jan. 26.

REINFORCING BARS . . .

REINFORCING BARS PLACED

2430 tons, ½ mile viaduct and ten grade separations, Connecticut turnpike, Greenwich-Stamford, Projects 304-01 and 303-01, to Truscon Steel Division, Republic Steel Corp., New York; 805 tons, steel piles, to Bethlehem Steel Co., Bethlehem, Pa.; Poirier & McLane Corp., New York, general contractor.

1015 tons, municipal parking garage, Copley Square, Boston, to Truscon Steel Division, Republic Steel Corp., Boston; S. & A. Allen Construction Co., Boston, general contractor.

815 tons, seven grade separations and Mill river bridge, Connecticut turnpike, Fairfield, Conn., Project 309-01, to Bethlehem Steel Co., Bethlehem, Pa.; Poirier & McLane Corp., New York, general contractor; 155 tons, steel piles, to Bethlehem Steel Co., Bethlehem, Pa.

375 tons, Idaho state railroad overcrossing, Canyon county, to unstated interest; Babbitt Construction Co., Boise, Idaho, general contractor at $418,018.

300 tons, commercial building-parking facilities, Lincoln-Beach streets, Boston, to Bethlehem Steel Co., Bethlehem, Pa.; Coleman Bros. Corp., Boston, general contractor.

265 tons, four state bridges, Dover, N. H., to Bancroft & Martin Rolling Mills Co., South Portland, Me.; W. H. Hinman Inc., Westbrook, Me., general contractor; 185 tons, steel piles, Bancroft & Martin Rolling Mills Co.

140 tons, telephone building, Great Falls, Mont., and Army construction, Eielson Air Base, Alaska, to Bethlehem Pacific Coast Steel Corp., Seattle.

132 tons, nose hangars, Elmendorf Air Field, Alaska, to Northwest Steel Rolling Mills Inc., Seattle; Baker-Ford Co., Bellingham, Wash., general contractor.

100 tons, dormitory addition, University of Massachusetts, Amherst, Mass., to Fabricated Steel Products Co., Quincy, Mass.; D. A. Sullivan & Sons Inc., Northampton, Mass., general contractor.

REINFORCING BARS PENDING

1140 tons, interstate highway bridge, Columbia river; bids to Oregon Highway Commission, Portland, Oreg., Mar. 1.

265 tons, four state bridges, Dover, N. H.; R. G. Watkins & Son Inc., Amesbury, Mass., general contractor.

100 tons, also machinery, etc., Haystack dam, Deschutes project, Oregon; bids to Bureau of Reclamation, Denver, late January.

100 tons, Idaho state road jobs, Twin Falls and Canyon counties; bids to Boise, Idaho, Jan. 20.

Unstated, Oregon state road separation, Klamath county; general contract to R. H. Jones, Hillsboro, Oreg., low at $101,735.

PIPE . . .

CAST IRON PIPE PENDING

221 tons, various sizes; bids to Eugene, Oreg., Jan. 24.

217 tons, system expansion; Clackamas, Oreg.; bids in.

RAILS, CARS . . .

LOCOMOTIVES PENDING

Colorado & Southern, 11 diesel-electric road switchers.

RAILROAD CARS PLACED

Boston & Main, 34 self-propelled rail diesel passenger cars to the Budd Co., Philadelphia.

Monon, 200 freight cars to Pullman-Standard Car Mfg. Co., Chicago; list comprises 180 fifty-ton boxcars and 20 seventy-ton covered hoppers.

Pacific Great Western, 150 seventy-ton flatcars, 50 seventy-ton gondolas and 10 fifty-ton refrigerator cars to the National Steel Car Co.

Trailer Train Co., 1000 piggyback flatcars, to ACF Industries Inc., New York; the company has arranged to purchase 500 modern 75-ft trailer-carrying flatcars from the Pennsylvania Railroad and from the Van Car Co., a subsidiary of Rail-Trailer Co., with which to begin operations pending delivery of cars on order. Operations of Trailer Train are expected to begin about Mar. 1.

RAILROAD CARS PENDING

Army Transportation & Maintenance Command, St. Louis, five 70-ton flatcars; bids closed Jan. 16.

FOUND [illegible]ERE WORLD FAMOUS AIRCRAFT ARE "BORN"

GRAND RAPIDS GRINDERS

Just take a look in their toolrooms! Every one of these famous aircraft manufacturers uses Grand Rapids Grinders . . . engineered and built for unusual long life of precision grinding. Our Model 55 shown here, for instance, features column and base of massive, one-piece casting for vibrationless rigidity and permanent alignment. Both longitudinal table travel and cross feed are hydraulically actuated. Wheel head has powered rapid vertical travel. Table speed is variable up to 125 fpm . . . faster than any other of this type and size.

That's why so many tool room men insist on Grand Rapids Grinders.

Grand Rapids No. 55 Hydraulic Feed Surface Grinder
This precision tool room type machine Table speed up to 125 fpm. Working surface of table is 12" x 36". Vertical movement of wheel head 18". Preloaded ball bearing spindle greased for life. Spindle speeds 1925 and 2500 rpm.

Just a note on your letterhead will bring you full details.

GALLMEYER & LIVINGSTON

GALLMEYER & LIVINGSTON COMPANY 407 Straight Ave., S.W., Grand Rapids, Mich.

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...because they went to their doctors in time

Many thousands of Americans are being cured of cancer every year. More and more people are going to their doctors *in time*. That is encouraging!

But the tragic fact, our doctors tell us, is that every third cancer death is a needless death...*twice* as many could be saved.

To learn how to head off cancer, call the American Cancer Society office nearest you or simply write to "Cancer" in care of your local Post Office.

American Cancer Society

These lock gates total 38½ tons and each measures 21 ft 4 in. high by 24 ft 6 in. wide. Built by Alco Products, Inc., Schenectady, N. Y., for New York State, Department of Public Works. *Contractor:* A. S. Wikstrom, Inc., Skaneateles, N. Y.

New lock gates for New York State Barge Canal

While a vessel waits, the two huge new lock gates begin to swing open at Lock 17 on the New York State Barge Canal, at Little Falls, N. Y. Replacement of the old gates by these new ones, built by Alco Products, Inc., Schenectady, is part of the canal's extensive renovation program.

The new gates were fabricated of Mayari R high-strength, low-alloy steel. Mayari R was selected because of its superior corrosion resistance. Under marine atmospheric conditions, Mayari R has demonstrated twice the resistance to corrosion of copper steel and from five to six times that of carbon steel. Tests have also proved its superior lasting qualities under exposure to industrial atmospheres.

Weldability was another important factor in the fabrication of these gates, as each gate contained more than a mile of arc welding. Mayari R can be readily welded by all the usual methods, using shop procedures similar to those used with plain-carbon structural steels.

Mayari R has many other advantages, all of which are described and illustrated in detail in Catalog 353. Every design, production and purchasing man should have this informative book. To receive a copy, all you have to do is drop a line to the nearest Bethlehem sales office.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

Mayari R makes it lighter... stronger... longer lasting

Cleveland cooling tower drive on test at the factory, to insure quiet, smooth running.

10 specific benefits for you with a CLEVELAND worm gear drive

WORM GEARING—the universal drive—affords exceptional advantages for practically all power transmission jobs. When it's *Cleveland* worm gearing you also get the extra benefits of 42 years of experience of specialists in this field. See how these Cleveland advantages can improve your operations and reduce maintenance:

1. **COMPACTNESS**—saves space.
2. **RIGHT-ANGLE CONSTRUCTION**—saves space.
3. **MINIMUM MOVING PARTS**—reduces maintenance.
4. **SMOOTH**, uninterrupted torque flow.
5. **QUIET RUNNING.**
6. **HIGH** shock load resistance.
7. **ENCLOSED** in oil bath—assures safety and minimum maintenance.
8. **CORRECT** gear alignment is maintained.
9. **LONG LIFE** from steel worm on bronze gear.
10. **EFFICIENCY** maintained throughout life of the unit.

Whenever you have a power transmission problem, get the full Cleveland story. Then you'll specify Cleveland worm gear drives. Write for helpful technical advice and ask for Catalog 400. The Cleveland Worm and Gear Company, 3270 East 80th Street, Cleveland 4, Ohio.

Affiliate: The Farval Corporation, Centralized Systems of Lubrication. In Canada: Peacock Brothers Limited.

CLEVELAND
Worm Gear
Speed Reducers

WHAT'S NEW IN MOTOR CONTROL? * * * GET IT FIRST IN CUTLER-HAMMER

Star studded with economy features

New Cutler-Hammer Three-Star Unitrol

Standardized Modular Construction

All control units are 20" wide and in multiples of 14" in height. This permits easy interchange of various sizes and types of control units without rearrangement of the entire control assembly and avoids wasting space with dead panels to adapt non-uniform control units. This standardized modular construction also insures good appearance at all times because horizontal lines match.

No industrial today can afford to ignore the savings Unitrol now offers in the installation and use of motor control

The new Cutler-Hammer Unitrol cuts costs from the moment it is delivered. It can save days, often weeks, in the time required for the installation of motor control. The high cost of mounting and wiring individual starters is eliminated. Earlier use of the production facilities brings a speedier return on the investment. Unitrol often effects vital savings in floor space, sometimes avoids the need for costly plant construction.

In performance, nothing can compare with the new Unitrol. Feature after feature of the astounding new Three-Star Control saves time and expense. Superlife vertical contacts *never* require maintenance care in all normal use. Adjustable overload relay coils let motors work harder safely, save the expense of both damaged motors and needless production interruptions. Full three-phase protection such as able engineers now demand is offered by three-coil overload relays.

Compare the new Unitrol with any other control centers and see the difference. See how sizes and types of control units can be interchanged in Unitrol without rearrangement of the entire assembly or the waste of space with dead panels. Saves time, saves space, saves money. Compare and you *too* will insist on Cutler-Hammer Three-Star Unitrol. Write or wire *now* for full information. CUTLER-HAMMER, Inc., 1211 St. Paul Avenue, Milwaukee 1, Wisconsin.

CUTLER-HAMMER

UNITROL

C-H

Uni-Plug disconnects control from power when unit is moved to test position, reconnects without misalignment when unit returns to operating position. Control panel is *always* vertical. Uni-Plug design permits back-to-back assemblies without staggering control units. Units are removed by merely disconnecting load and control wiring at terminal boards. This wiring is cabled, marked and color coded.

Unitrol provides either circuit breakers or fused disconnect switches of advanced design. Both have three-position self-aligning operators arranged for padlocking with as many as three locks in the "off" position. Recessed pushbuttons and concealed door hinges are typical features that add to safety and fine appearance.

The name UNITROL is a Cutler-Hammer trade mark

Components front of panel mounted without stacking. No crowding, no power connections near panel fasteners. Many Three-Star Control exclusives. Superlife vertical contacts *never* require maintenance expense in all normal control uses. Adjustable overload relay coils let motors work harder with safety. Full Three-Phase Protection with 3-Coil overload relays on standard size starter panels.